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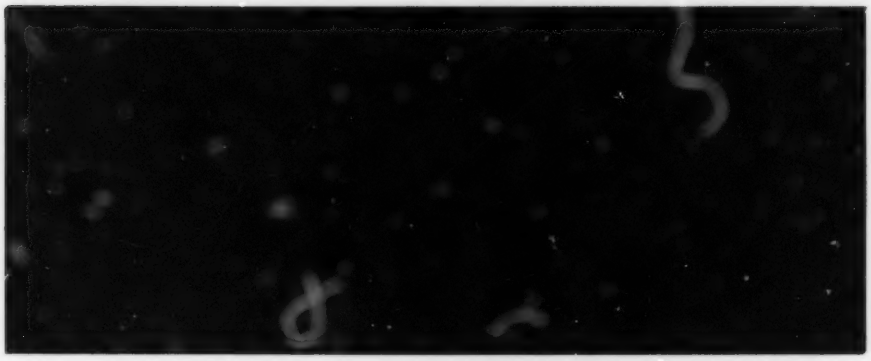

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The Effect of Dietary Sulphur on Available Thiamine and Disease Related to Thiamine Deficiency

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Final Report

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FINAL REPORT

THE EFFECT OF DIETARY SULPHUR ON AVAILABLE THIAMINE AND DISEASE RELATED TO THIAMINE DEFICIENCY IN SASKATCHEWAN RUMINANTS

Project #2.4 - 30
Saskatchewan Agriculture Development Fund

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1.0 Executive Summary

1.1 Abstract

The objectives of this research were to undertake surveys of Saskatchewan cattle under differing management practices to ascertain their available and total thiamine levels. Three studies were undertaken: a demographic epidemiologic study, a cross-sectional study using beef cattle, and a cross-sectional study using dairy calves. The demographic study showed that cattle from central Saskatchewan had significantly less available thiamine than other areas of the province. No regional difference was noted in total thiamine. These data will act as a reference future studies. The cross-sectional studies in beef demonstrated that both available and total thiamine levels were depressed in animals on high water sulfate intake. These studies indicate that beef cattle consuming high levels of sulfate in their water are likely to have depressed blood thiamine levels. The dairy cross-sectional study showed, contrary to the beef study, that animals on high sulfate water had increased levels of available thiamine in their blood three and four months after birth, but their total thiamine levels did not differ. This elevation of thiamine may indicate that an antimetabolite had been produced. Supplementing the feed of cattle with thiamine would likely be beneficial in this province. As thiamine is not expensive, and adding it to the ration is straight forward, the cost benefit of this preventive measure may be seen in increased growth and probable prevention of the thiamine related disease polioencephalomalacia.

1.2. Summary

The disease polioencephalomalacia has been produced in sheep following the administration of high levels of sulphur in the diet. There have been numerous reports of this disease in the field associated with high sulfate levels. As the literature has often stated that polioencephalomalacia is a result of thiamine deficiency, and the treatment of this disease involves treatment with thiamine, the question of what constitutes normal thiamine levels in beef and dairy cattle was raised.

Thiamine deficiency may not solely be responsible for the disease polioencephalomalacia. Thiamine deficiency is, however, responsible for decreased growth and production. Therefore, any management procedures which decrease the availability of thiamine to sheep and cattle should be avoided, but if this is impossible, supplementation of thiamine may be required As no data were available concerning what is considered normal thiamine levels in cattle in Saskatchewan, a demographic study was undertaken. To establish whether a relationship between sulfate and available thiamine levels exists in ruminants, a cross-sectional study was undertaken in both beef and dairy cattle.

Before advances in biologic technology, an accurate assessment of available or usable blood thiamine was impossible. The methodology described within this report refers to a better method for evaluating available thiamine. (Mr. Andrzej Olkowski has developed this test).

Most of the field work was conducted during 1989. A total of 71 farms was used in this study. The farms were collected from north, central and southern parts of the Province to enable assessment of geographic area on thiamine levels. Drinking water from these farms was analyzed for sulphates. The total number of blood samples taken in these studies was 1005. The sampled animals represent all major breeds raised in Saskatchewan.

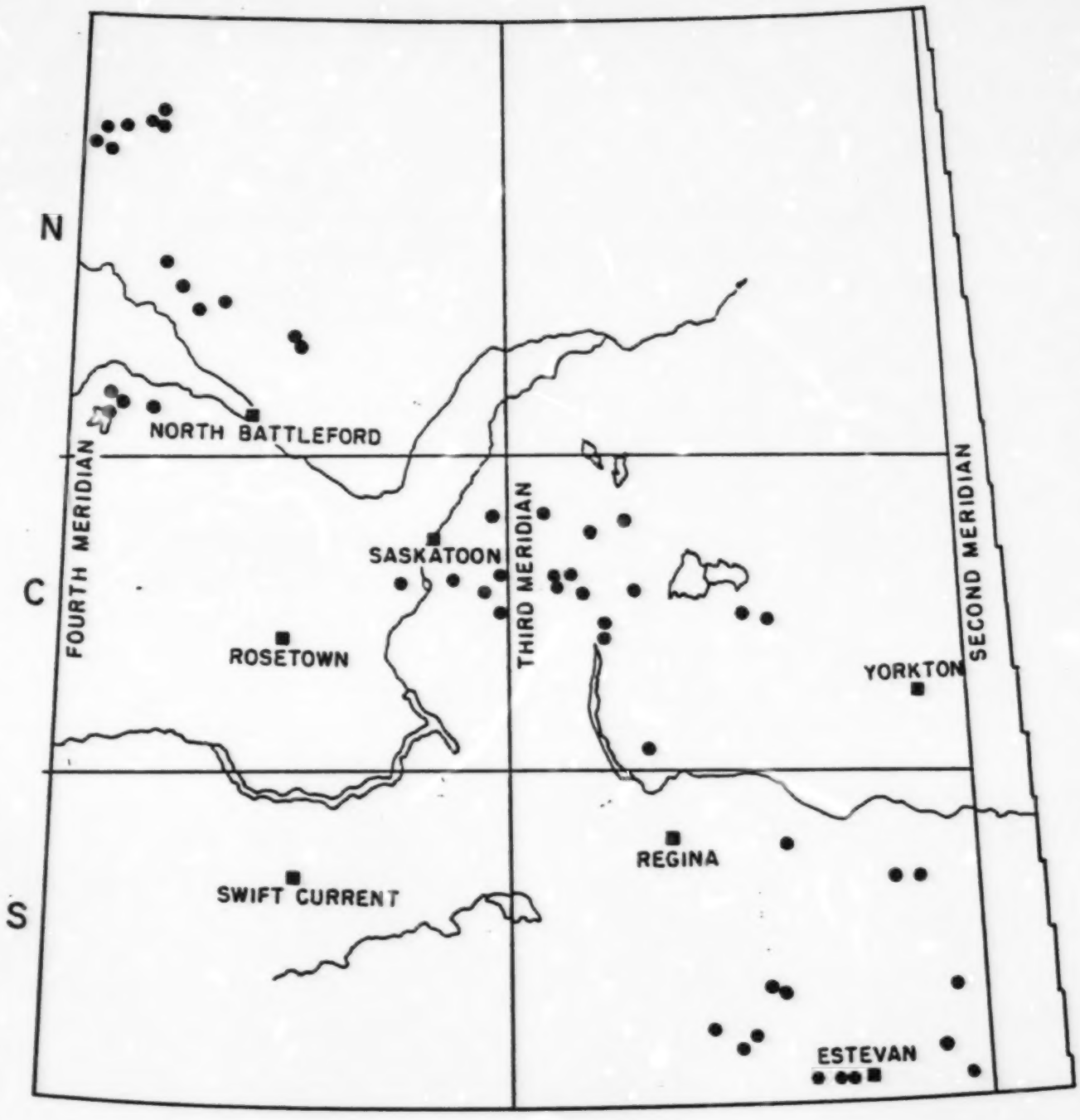
The demographic survey was aimed to gain knowledge concerning sulfate level in the water on Saskatchewan farms, to evaluate blood thiamine concentration in the population of Saskatchewan cattle, and to locate farms with high (greater than 1000 ppm) and low (less than 200 ppm) levels of sulfate for the cross-sectional study to come later. The farms included large-scale feedlot operations as well as small producers. The results of the demographic survey indicated little difference in the total thiamine among regions of the Province. There was however a significant decrease in the available thiamine in animals from the central part of the Province.

The beef cattle cross-sectional study showed that high sulfate in the water depressed available thiamine levels. It is of note that animals in the high sulfate group contain a few individuals with very low thiamine levels. It is possible that these individuals account for the individual nature of polioencephalomalacia as a disease.

The cross-sectional diary study showed that young calves had similar levels of available thiamine regardless of water source. This could most likely be accounted for by mother's milk supplying the nutrients required for the animal. As the calves became more forage dependent, an elevation in total thiamine was noted in the high sulfate group. This may be explained by inhibition of utilization of available thiamine by thiamine antimetabolites produced in the rumen under the influence of sulfate.

The results of these study do indicate that sulfate has an influence on available thiamine levels in Saskatchewan ruminants. Therefore, supplementation with thiamine may be advantageous for these animals. The findings in the cross-sectional dairy study indicate that thiamine metabolism in ruminants should be investigated in further detail, potentially to elucidate preventive methods for polioencephalomalacia, and increased productivity through adequate Vitamin B_1 levels.

Figure 1


N
C
S
NORTH BATTLEFORD
SASKATOON
ROSETOWN
YORKTON
REGINA
SWIFT CURRENT
ESTEVAN
FOURTH MERIDIAN
THIRD MERIDIAN
SECOND MERIDIAN

Demographic Study

50 beef cattle farms have been surveyed across the province. Drinking water samples from wells and/or dugouts were analyzed for the presence of sulfate.

Water analyses:

		Sulfate (ppm)		
	Total	< 300	300-1000	>1000
Southern region	14	(21%)	(36%)	(43%)
Central region	19	(26%)	(32%)	(42%)
Northern region	17	(59%)	(41%)	(0%)
Total farms sampled:	50	(36%)	(18%)	(28%)

2.0 Demographic Study of Available and Total Thiamine Levels in Saskatchewan Cattle.

2.1 Introduction.

The available and total blood thiamine levels of Saskatchewan cattle is unknown. As thiamine has been implicated in central nervous disease and production, a general survey was undertaken to describe the distribution of thiamine levels in ruminants across the Province.

2.2. Materials and Methods.

2.2.1 Sampling

The survey was conducted in the second half of 1989. A total of 50 farms took part in this study. Sampling occurred across the Province. Regions used for this survey included the major geographic regions (south, central, north), and included large-scale feedlot operations as well as small producers (Fig 1). Local agricultural specialists and veterinarians helped us select farms for the demographic study (without their cooperation and assistance this project would have been impossible). An attempt was made to ensure random order of selection; however, as this survey was based on voluntary participation, the randomization was limited to the producers who responded to our request and agreed to lend their animals for sampling. The animals on each farm were sampled randomly.

Blood samples were taken from 221 animals in an age category of 3-14 months. Blood samples were obtained from the jugular vein in glass vacutainers containing heparin. The blood samples were transferred into plastic tubes, stoppered and stored at -20 degrees Centigrade until analyzed.

Water samples were taken from these farms. They were collected into plastic vials, and frozen until analyzed.

2.2.2 Analysis.

2.2.2.1 Water Sulfate.

Water sulfate analysis was performed as described by Sorbo (Methods in Enzymology, Vol. 143, pp. 3-6, 1987).

2.2.2.2 Blood Thiamine.

Blood thiamine concentration was evaluated using biological methods. The phytoflagellata and bacterial procedures described below are modifications of the assays of Baker and Frank (1968) and Sarett and Cheldelin (1944) respectively.

Materials and procedures common for both methods

Trans-aconitate buffer: Trans-aconitic acid (Sigma) 5g,: water 1000ml, (adjusted to pH 4.0 with KOH).

Thiamin Stock Solution: Thiamine hydrochloride (B_1 HCl) 1 mg/L in trans-aconitate buffer.

Reference sample: To establish a reference value, 250 ml of cattle blood was stored as 1 ml allotments at -20°C. Initially 25 assays were carried out (in quadruplicates) and the mean was taken as an internal reference value. This reference standard was used with each assay to determine variations between assays.

Preparation of Standards: Standards containing 0.75, 1.5, 3.0, 6,and 12 µg B_1 HCl/L were prepared by diluting the thiamine stock solution in aconitate buffer and autoclaving at 115°C for 20 min.

Preparation of samples: Samples of blood were stored at -20°C. Freshly thawed samples were added to aconitate buffer in glass tubes at a ratio of aconitate

buffer to blood 1:4. All tubes were then vortexed, capped and autoclaved at 115°C for 20 min. The homogenate was vortexed again while still hot and centrifuged at 2000 g for 10 min. The supernatant was transferred to sterile plastic tubes and centrifuged at 4000 g for 15 min to obtain a clear supernatant containing B_1. This B_1 extract was used for the assays. From this step onwards all equipment and materials used in the assay were sterilized and all procedures were carried out using sterile techniques.

2.2.2.2.1 Ochromonas danica assay

Stock culture of O. danica [American Type Tissue Collection (ATCC No.30004) ATCC laboratory Rockville, MA] was maintained on thioglycolate medium BBL-11260 (Microbiology Systems, Becton Dickinson, Cockeyville, MA) according to ATCC instruction. Three days before the assay, stock culture of O. danica was subcultured on BBL-11260 medium and transferred to an incubator illuminated with two 15-watt fluorescent lamps and a 60-watt incandescent lamp with temperature maintained at 30°C. A basic assay medium was prepared according to the method of Baker and Frank (1968) and the final assay medium was prepared by diluting the basic assay medium in distilled water at a ratio of 1.25:1. The O. danica inoculum was prepared by adding a few drops of 3 d old subculture to 5 ml of isotonic saline followed by vortexing and centrifugation at 1000 g for 5 min. The supernatant was discarded and the pellet containing the protozoa was next washed twice in saline followed by resuspension in saline (approximately 1 ml) at a concentration equivalent to approximately 1.0 optical density (OD) units at 650 nm wavelength on 1 cm path. The final assay solution was prepared by mixing 4 drops of the protozoal inoculum with 20 ml of final assay medium. Aliquots (160 µl) of this final assay solution was next added to each of the 96 wells in the microplate (Falcon 3792, Becton Dickinson Labware, Oxnard, CA) and allowed to remain at room temperature (RT) for 30 min. to condition the microplate prior to adding the samples. Equal volumes (40 µl) of blank (aconitate buffer), standards, reference sample, and unknown samples were then added to the wells in the microplate in quadruplicates, followed by incubation at 30°C with illumination for 96 h. At the end of the incubation period, microplates were vortexed and read at 650 nm on the microplate reader (V max,

Molecular Devices Corporation, Palo Alto, CA). All calculations were carried out using a software program, 'SoftMax' (Molecular Devices Corporation, Palo Alto, CA) interfaced to the microplate reader.

2.2.2.2.2 Lactobacillus fermenti method

Long term cultures of Lactobacillus fermenti (ATCC No. 9338, Difco Laboratories, Detroit, MI) were maintained as stab cultures of Lactobacilli agar (Difco Lab, Detroit, MI) at 2 - 8°C. Stock cultures were prepared by transferring stab culture to Lactobacilli broth (Difco Laboratories, Detroit, Michigan), and incubating at 37°C for 18 - 20 h. These cultures could be stored at 2 - 8°C for up to 2 weeks. Stock cultures were maintained by transfer to a Lactobacilli broth fortnightly. One day before the assay, a stock culture of L. fermenti was transferred to Lactobacilli broth and incubated at 37°C for 16-18 hours. Bacterial inoculum was prepared by centrifuging the broth containing the culture at 2,000 g for 5 min. The supernatant was discarded, and the remaining pellet containing bacteria was washed three times in isotonic saline and resuspended in saline at a concentration approximately equivalent to 1.0 OD units at 650 nm on 1 cm path. The final assay medium was prepared by mixing 8.5 g of dehydrated Lacto thiamin assay medium (Difco Lab, Detroit, MI) with 160 ml of distilled water and boiling for 3 min. This was distributed into 20 ml allotments and sterilized at 110°C for 1 min. The final assay solution was prepared by mixing 5 drops of bacterial inoculum with 20 ml of final assay medium. Aliquots (160 µl) of this solution was next added to each of the 96 wells in the microplate 30 min before adding the samples. Equal volumes (40 µl) of blank (aconitate buffer), standards, reference sample, and unknown samples were then added into the wells of the microplate in quadruplicates, followed by incubation at 37°C for 16-18 h. Following this, the microplates were vortexed and read directly on the microplate reader at 650 nm. All calculations were carried out using a software program, 'SoftMax', interfaced to the microplate reader.

2.2.2.3 Statistical Analysis.

As this was a descriptive study, the data were described using mean and standard deviation as the data came from the sample of a population and not an experimental population. The different regions of the Province were compared among each other using a general linear model analysis of variance (GLM ANOVA) from the microcomputer package (Number crunch statistical system, NCSSN). A Fischer's LSD test was used to determine which means differed from one another. A statistical significance was assumed to exist when the probability of making a type I error was less than 5%.

2.3 Results.

The regional distribution of the farms sampled can be seen in Figure 1.

The Ochromonas method for available thiamine showed a significant difference among regions of the Province, but total levels did not differ. The central region had lower levels of available thiamine than the northern and southern regions (Figure 2; Table 1; Appendix 1).

The total mean levels of thiamine for all animals in the Province were 24.36 µg/L for available thiamine and 31.28 µg/L total thiamine.

The results were analyzed with respect to sulphate levels in the water obtained from the farms where animals were sampled. For each region there were decreased levels of both available and total thiamine in the higher sulphate farms (Fig. 3-5; Appendix 2).

Table 1 Available and total blood thiamine in cattle from various regions of Saskatchewan (μg/L)

Region	Ochromonas (N)	Lactobacillus (N)
North	26.96 ± 1.01^{b} (97)	33.07 ± 1.03 (97)
Central	22.54 ± 1.09^{a} (83)	29.56 ± 1.11 (83)
Southern	24.52 ± 1.55^{ab} (41)	32.34 ± 1.58 (41)

a,b indicate means differ $P < 0.05$

Figure 2.

DEMOGRAPHIC DISTRIBUTION OF CATTLE BLOOD THIAMINE

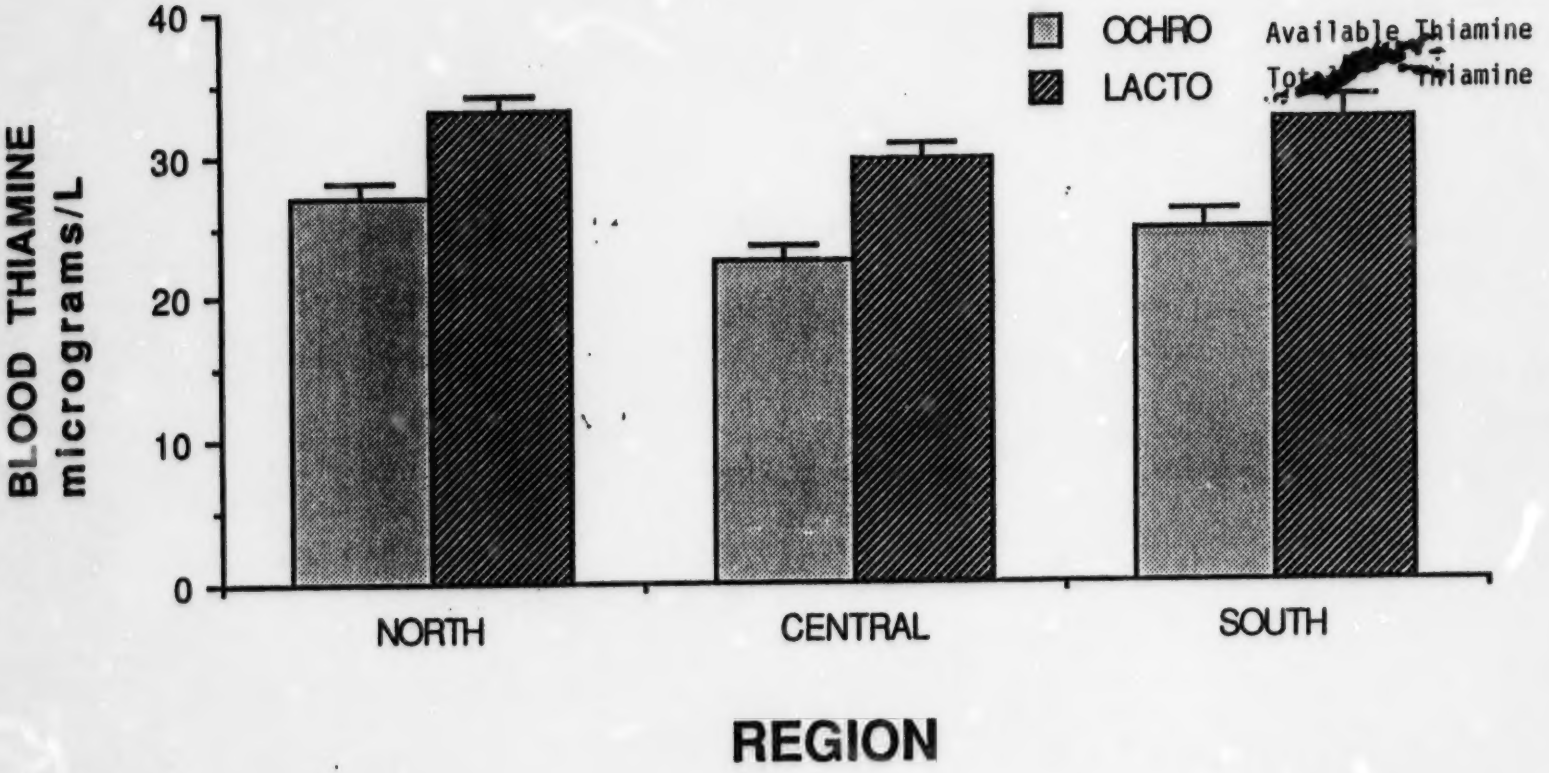


Figure 3

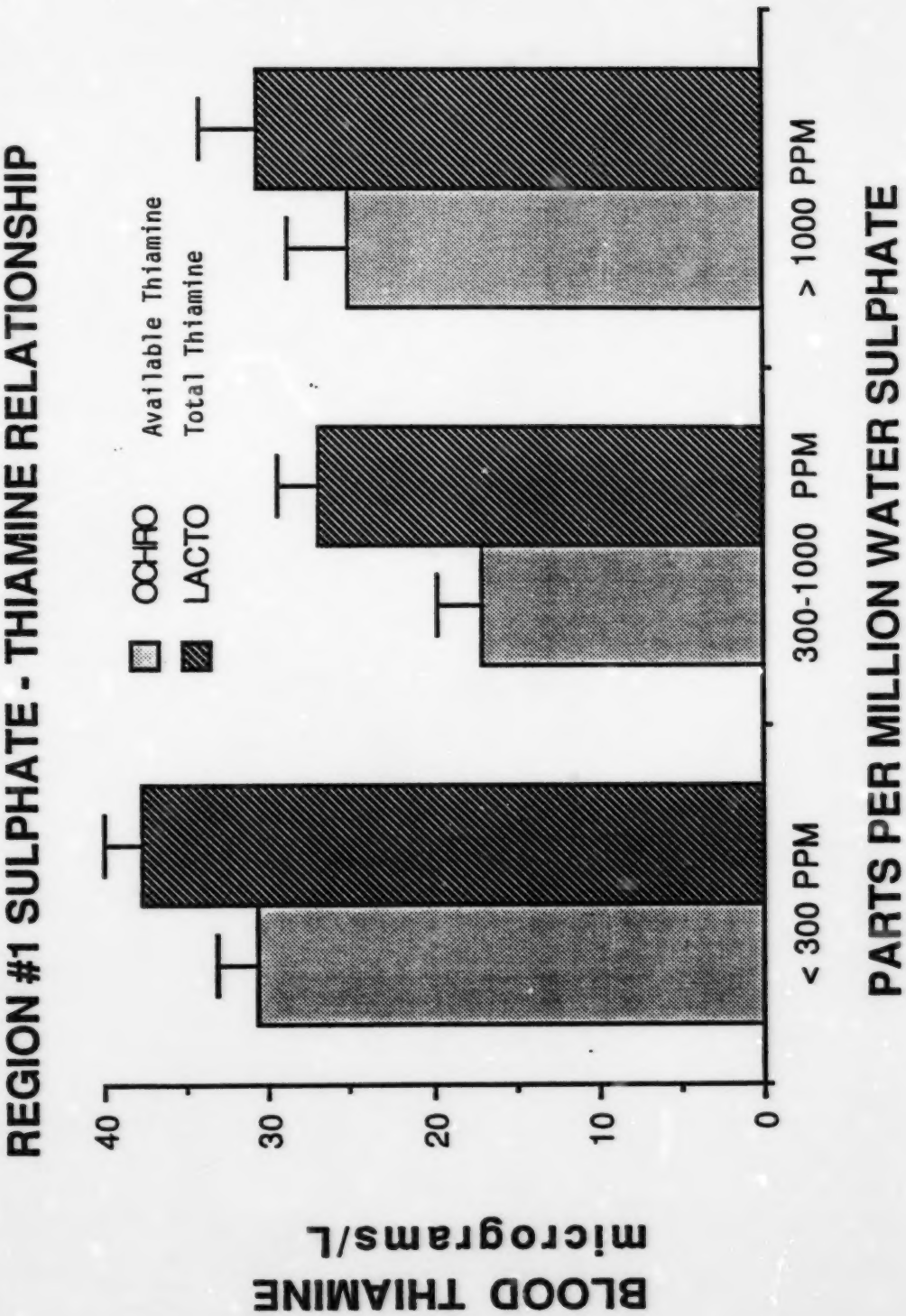

REGION #1 SULPHATE - THIAMINE RELATIONSHIP
OCHRO Available Thiamine
LACTO Total Thiamine
BLOOD THIAMINE micrograms/L
40
30
20
10
0
< 300 PPM
300-1000 PPM
> 1000 PPM
PARTS PER MILLION WATER SULPHATE

Figure 4.

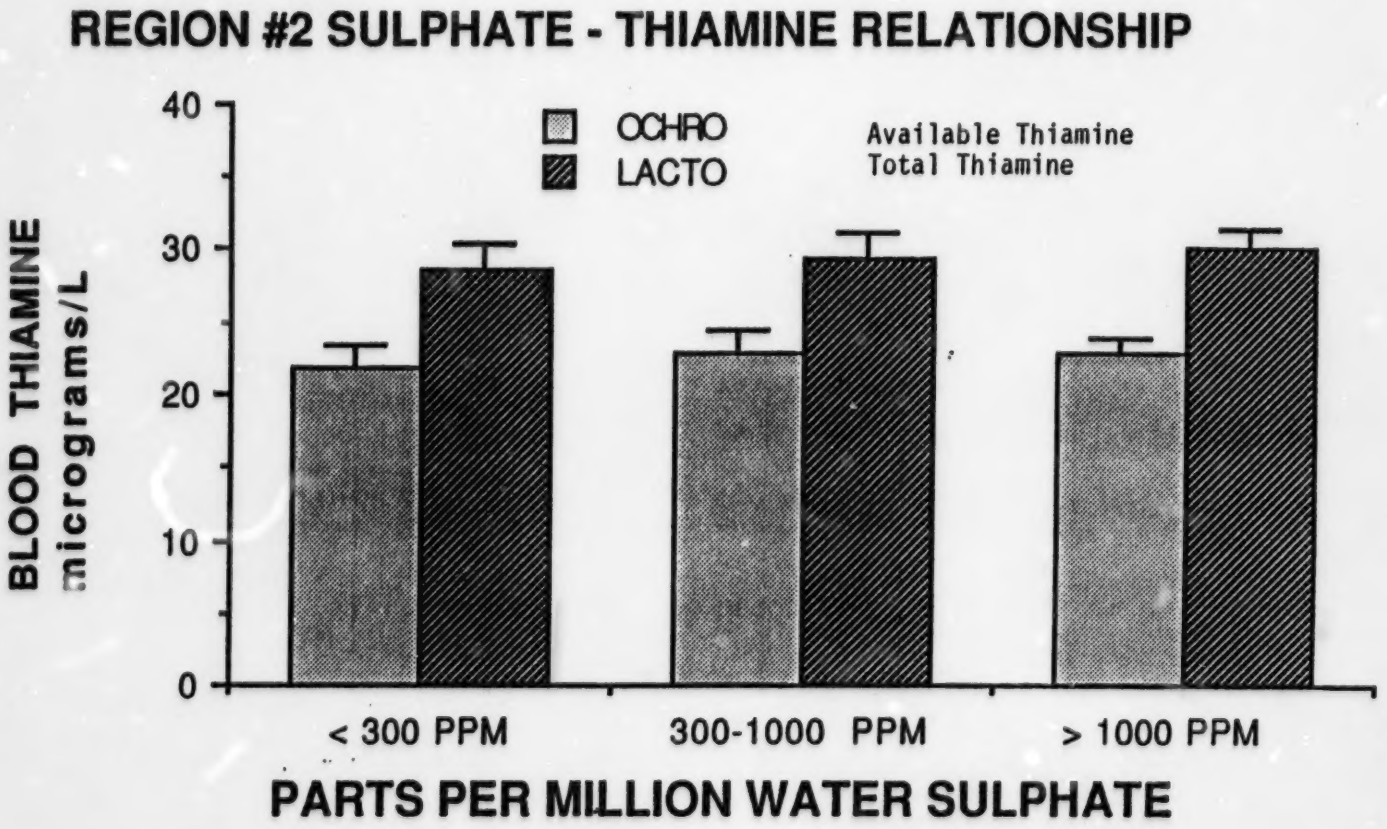
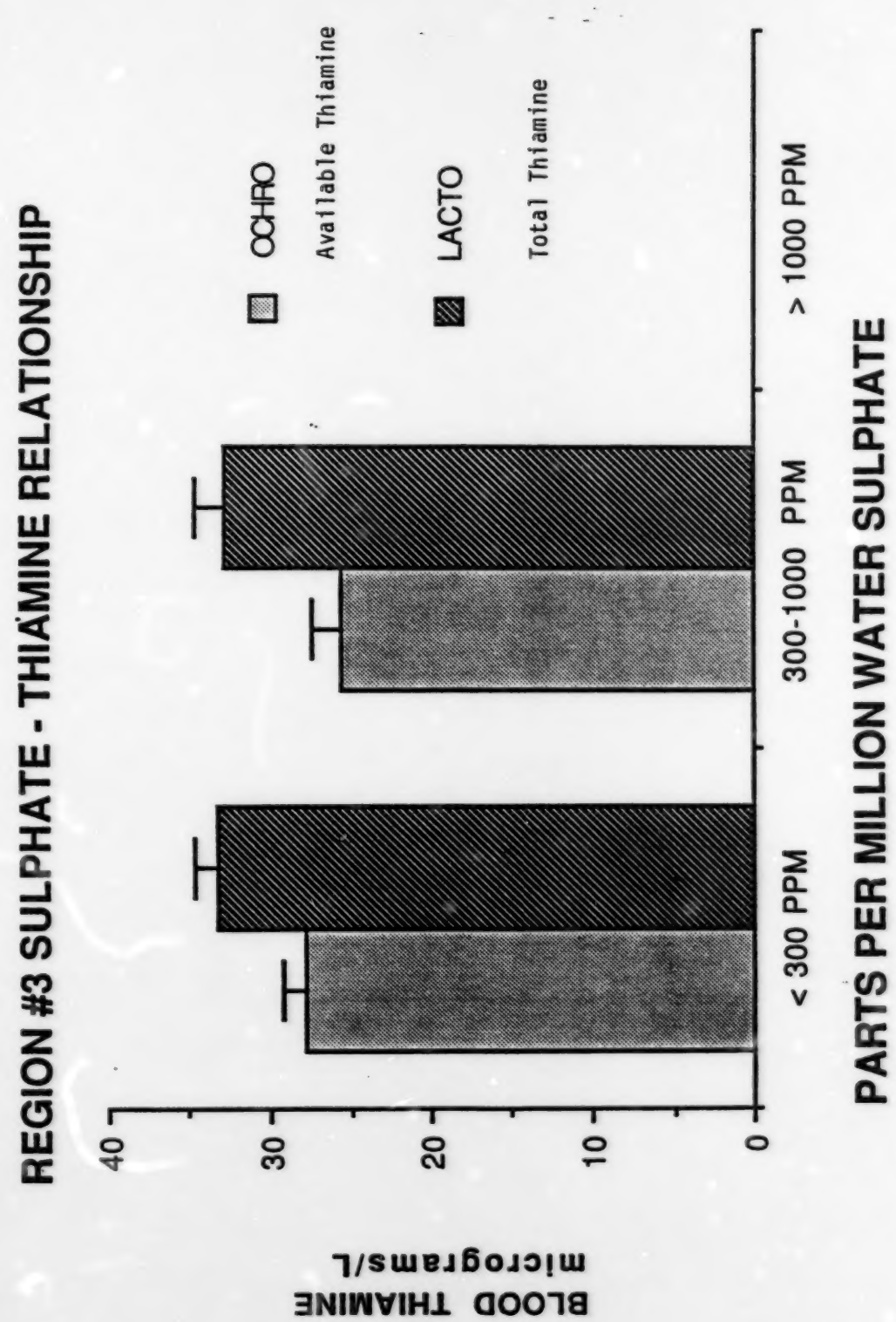

REGION #2 SULPHATE - THIAMINE RELATIONSHIP
BLOOD THIAMINE micrograms/L
40
30
20
10
0
OCHRO
LACTO
Available Thiamine
Total Thiamine
< 300 PPM
300-1000 PPM
> 1000 PPM
PARTS PER MILLION WATER SULPHATE

Figure 5


REGION #3 SULPHATE - THIAMINE RELATIONSHIP
BLOOD THIAMINE
micrograms/L
40
30
20
10
0
OCHRO
Available Thiamine
LACTO
Total Thiamine
< 300 PPM
300-1000 PPM
> 1000 PPM
PARTS PER MILLION WATER SULPHATE

3.0 Beef Cross-Sectional Study.

3.1 Introduction.

Having established which part of the Province had high and low water sulfate levels, the next stage was to compare blood thiamine levels from animals on high sulfate levels with those on low sulphate intake in the water.

3.2. Materials and Methods.

3.2.1 Animals.

Beef breeds of mixed variety were used from a total of 18 farms in the study. Blood samples were obtained from 401 beef cattle aged 8 to 16 months old. Farms were considered to have low sulfate levels if the water levels of sulphates were less than 200 parts per million, or were considered to be farms with high sulfate levels when the water sulfate level was greater than a thousand parts per million. Two hundred animals were taken from 10 farms with low levels of sulfate, and 201 animals were taken from 8 farms with high sulfate levels. (Note: One animal was eliminated from the statistical analysis as an outlier).

3.2.2 Analysis.

Thiamine and sulfate analyses were exactly the same as those described previously.

3.3 Statistics.

Means and standard deviations were used for describing the samples. High and low sulfate levels were compared using a general linear model analysis of variance as described previously. The statistical significance was assumed to exist when the probability of making a type 1 error was 5%.

3.4 Results.

A very significant difference between high and low sulfate level was seen with respect to both available and total thiamine levels (Table 2; appendix 2).

Table 2 Available and total thiamine in beef cattle drinking high and low sulphate water in Saskatchewan

Region	Ochromonas (N)	Lactobacillus (N)
Low	47.28 ± 0.79^{a} (199)	53.51 ± 0.86^{b} (199)
High	37.94 ± 0.79^{b} (201)	45.06 ± 0.87^{b} (201)

a,b indicate means differ $P < 0.05$

4.0 Calf Study.

4.1 Introduction.

This study was undertaken to evaluate the effect of consumption of water containing high sulfate levels in young calves in the dairy industry.

4.2. Materials and Methods.

4.2.1 Animals Selection and Sampling.

Twenty one farms with both high and low sulphate levels in the water from the communities of Osler, Warman, Martensville, Dalmeny, Saskatoon Sutherland, and Saskatoon RR#4 and RR#5 were selected. Blood samples were taken from 3 to 6 calves at each farm during the first 4 weeks of life, and then at monthly intervals for 4 months.

4.2.2 Analyses.

Water and blood were analyzed as previously mentioned.

4.3 Results.

The available blood thiamine activity, at 3 months and 4 months the animals receiving high water sulfate had elevated available blood thiamine activity. Similarly affected were total thiamine levels from calves sampled during the 3 month period (Table 3; Appendix 4).

Table 3 Available and total thiamine in dairy calves fed high and low sulphate water in Saskatchewan.

Time after birth	Ochromonas	Lactobacillus
1 month (low)	17.07 ± 1.38	23.81 ± 1.65
1 month (high)	18.34 ± 0.99	24.69 ± 1.19
2 month (low)	29.25 ± 1.98	34.91 ± 2.21
2 month (high)	32.99 ± 1.42	39.86 ± 1.59
3 month (low)	28.87 ± 2.32[a]	36.74 ± 2.86[a]
3 month (high)	35.44 ± 1.61[b]	44.63 ± 1.99[b]
4 month (low)	31.42 ± 2.13[a]	40.36 ± 2.47
4 month (high)	36.93 ± 1.61[b]	46.28 ± 1.86

a,b indicate means differ $P < 0.05$

4.4. Discussion.

Results from this calf study indicate that sulphates may or may not interfere with available thiamine in young dairy calves. The reason for the elevation in the amount of available thiamine is not clear. It may be hypothesized that an antimetabolite is produced in the presence of sulfate; therefore, blood thiamine levels are elevated as a result of inability to be used by enzyme systems. On the other hand this elevation may indicate a change in feeding practice, or some other confounding variable, in the high sulphate group.

5.0 General Discussion.

From these studies it is clear that sulphates do indeed have an effect on thiamine status of cattle in various regions of the province. In addition, sulphates affect the thiamine status of animals of all ages and management regimes examined. Since several animals drinking water containing low levels of sulphates had very low levels of available thiamine in their blood, it is unlikely that sulphate alone accounts for the differences in available thiamine concentration seen in the blood of the animals examined.

The regional differences of available thiamine status do not match the observation that polioencephalomalacia, a thiamine related disease, is more common in the southern part of the province. This discrepancy may indicate a difference in detection of the disease, or a bias in the number of high sulphate samples included in the study. Further analysis is ongoing to establish whether this bias exists.

Beef cattle showed significantly depressed thiamine levels when their water supply was high in sulphates. This finding matches our experimental observations previously reported in sheep. In addition, it gives credence to those authors who have empirically suggested that thiamine deficiency is associated with high sulphate concentrations in sloughs. Thiamine deficiency is known to reduce growth performance, and most likely cause polioencephalomalacia. For these

reasons feedlot managers should consider adding thiamine to the ration as it is inexpensive and easy to handle.

Dairy calves increased blood thiamine, both available and total, over the period of the study. Sulphate water had an interesting and reversed effect from that which was expected. The increase in available thiamine in the presence of high sulphate may indicate that these animals were being supplemented through food-stuffs that are not available to range animals and feedlot beef. Conversely, these results may indicate the presence of an antimetabolite in the body which blocks utilization of thiamine. Thiamine would then accumulate in the blood even though the animal was thiamine deficient.

6.0 Conclusions.

We conclude from this study that cattle in Saskatchewan are likely to be marginally deficient or deficient in thiamine, based on these limited studies. As thiamine is inexpensive and easy to add to the ration we recommend addition of thiamine to the feed. Thiamine is not toxic so over dosing is unlikely to cause problems. How sulphates relate to polioencephalomalacia remains a mystery. Although sulphates may be important in the pathogenesis of this disease, there are likely to be other nutritional factors which need to be examined.

7.0 Impact on Agriculture.

The impact on agriculture of this program is likely to be subtle, but none the less significant in Saskatchewan. If recommendations to supplement animals with thiamine are followed, and increased growth rate is obtained by removing a subclinical deficiency. The information gained from these studies will act as a base upon which to build when studying thiamine related diseases. These data stimulate questions concerning the effect of sulphates on ruminant physiology and general nutrition. As water quality is of high importance to the province we hope further studies are undertaken to evaluate the effect of sulphates on ruminant nutrition.

8.0 List of Papers Prepared and Talks Given.

8.1 Manuscripts Submitted.

No manuscripts have been submitted up to date.

8.2 Manuscripts In Preparation.

Olkowski, A.A., Rousseaux, C.G., and Christensen, D.A. Available and Total Thiamine Levels in Cattle of Saskatchewan. (To be submitted to the Canadian Journal of Agriculture).

8.3 Presentations.

No presentations have been given to date.

9.0 Personnel Involved in the Project.

Andrzej Olkowski - 100% of time committed to the project (field work and all analyses).

Dr. C.G. Rousseaux - 5% of time committed to the project (administration, consultation, final reporting).

Dr. D.A. Christensen - 2% time committed to the project (consultation and farmer recruitment).

10.0 Equipment Items in Excess of $5000.

No equipment has been purchased with these funds.

11.0 Statement of Expenditures.

Saskatchewan Agriculture Development Fund grant	20,000
Final payment	4,995
TOTAL	24,995

Expenditures:

Salaries (A. Olkowski)	17,848.30
Travel to farms - phone	3,384.98
Consumable materials	3,761.72
TOTAL	24,995.00
Balance	nil

12.0 Appendices.

APPENDIX 1: SULPHATE - THIAMINE RELATIONSHIP

Date/Time 04-24-1990 00:16:05
Data Base Name C:/survey\Demograf
Description Data created at 16:55:02 on 22-04-1990

SO4 level
1=<300 ppm
2=300-1000ppm
3=>1000

Expected Mean Squares ... Balanced Case

Source	DF	Expectation of Mean Square (S stands for ERROR).
A	2	S+nA
S	218	S

Analysis of Variance Report

ANOVA Table for Response Variable: OCHRO-B1

Source	DF	Sum-Squares	Mean Square	F-Ratio	Prob>F	Error Term
A (LEVL-SO4)	2	917.1909	458.5954	4.65	0.0105	ERROR
ERROR	218	21481.7	98.53992			
TOTAL(Adj)	220	22398.89				

Means & Standard Errors for Y = OCHRO-B1

Term	Count	Mean	Std.Error
ALL	221	24.35994	
A: LEVL-SO4			
1	101	27.06733	.9877463
2	72	22.88334	1.169876
3	48	23.12917	1.4328

Fisher's LSD Comparison Report

Response Variable: OCHRO-B1 Factor(A,LEVL-SO4) Error Term: ERROR

Summary Results 05 Level Codes

Code(Level)	Mean	ABC
A(2)	22.88334	..S
B(3)	23.12917	..S
C(1)	27.06733	SS.

Analysis of Variance Report

ANOVA Table for Response Variable: LACTO-B1

Source	DF	Sum-Squares	Mean Square	F-Ratio	Prob>F	Error Term
A (LEVL-SO4)	2	376.8077	188.4038	1.81	0.1654	ERROR
ERROR	218	22634.98	103.8302			
TOTAL(Adj)	220	23011.79				

Means & Standard Errors for Y = LACTO-B1

TermCount	Mean	Std.Error
ALL 221	31.27504	
A: LEVL-SO4		
1 101	33.03663	1.013914
2 72	30.54681	1.200869
3 48	30.24167	1.470758

----------Descriptive Statistics----------

Detail Report

Variable: OCHRO-B1 Blood thiamine OCHRO method

Mean - Average	24.84887	No. observations	221
Lower 95% c.i.limit	23.51856	No. missing values	0
Upper 95% c.i.limit	26.17918	Sum of frequencies	221
Adj sum of squares	22398.89	Sum of observations	5491.6
Standard deviation	10.09025	Std.error of mean	.6787437
Variance	101.8131	T-value for mean=0	36.61009
Coef. of variation	.4060648	T prob level	0.0000
Skewness	.6943964	Kurtosis	1.371428
Normality Test Value	1.096	Reject if > 1.025(10%)	1.040(5%)
100-%tile (Maximum)	67.2	90-%tile	37.6
75-%tile	30.8	10-%tile	12.55
50-%tile (Median)	24	Range	63.8
25-%tile	17.9	75th-25th %tile	12.9
0-%tile (Minimum)	3.4		

3.4----------Line Plot / Box Plot----------67.2
11112 13413723469468879598769683595723 67 22611 23 111 1 1 11
1
-------[XXXXXXmaXXXXXX]---------

Distribution & Histogram

Variable: OCHRO-B1

Bin	Lower	Upper	Count	Prcnt	Total	Prcnt	Histogram
1	3.4	6.944444	6	2.7	6	2.7	:***
2	6.944444	10.48889	8	3.6	14	6.3	:****
3	10.48889	14.03333	15	6.8	29	13.1	:********
4	14.03333	17.57778	24	10.9	53	24.0	:**********
5	17.57778	21.12222	31	14.0	84	38.0	:**********
6	21.12222	24.66666	32	14.5	116	52.5	:**********
7	24.66666	28.21111	32	14.5	148	67.0	:**********
8	28.21111	31.75555	24	10.9	172	77.8	:**********
9	31.75555	35.3	18	8.1	190	86.0	:*********
10	35.3	38.84444	16	7.2	206	93.2	:********
11	38.84444	42.38889	4	1.8	210	95.0	:**
12	42.38889	45.93333	6	2.7	216	97.7	:***
13	45.93333	49.47778	1	0.5	217	98.2	:*
14	49.47778	53.02222	1	0.5	218	98.6	:*
15	53.02222	56.56666	0	0.0	218	98.6	:
16	56.56666	60.11111	2	0.9	220	99.5	:*
17	60.11111	63.65555	0	0.0	220	99.5	:
18	63.65555	67.2	1	0.5	221	100.0	:*

----------Descriptive Statistics----------

Detail Report

Variable: OCHRO-B1 Blood thiamine OCHRO method

Break: LEVL-SO4 = 1

Mean - Average	27.06733	No. observations	101
Lower 95% c.i.limit	24.78012	No. missing values	0
Upper 95% c.i.limit	29.35454	Sum of frequencies	101
Adj sum of squares	13423.46	Sum of observations	2733.8
Standard deviation	11.58597	Std.error of mean	1.152847
Variance	134.2346	T-value for mean=0	23.47869
Coef. of variation	.4280425	T prob level	0.0000
Skewness	.5295734	Kurtosis	1.051064
Normality Test Value	1.083	Reject if > 1.051(10%)	1.079(5%)
100-%tile (Maximum)	67.2	90-%tile	39
75-%tile	34.6	10-%tile	12
50-%tile (Median)	26.6	Range	63.8
25-%tile	19.5	75th-25th %tile	15.1
0-%tile (Minimum)	3.4		

3.4----------Line Plot / Box Plot----------67.2
111 1 113 11 2142234153123363221513115 6 12411 12 11 1 11
---------[XXXXXXXmaXXXXXXXX]------

Distribution & Histogram

Variable: OCHRO-B1 Break: LEVL-SO4 = 1

Bin	Lower	Upper	Count	Prcnt	Total	Prcnt	Histogram
1	3.4	7.3875	4	4.0	4	4.0	:****
2	7.3875	11.375	5	5.0	9	8.9	:*****
3	11.375	15.3625	4	4.0	13	12.9	:****
4	15.3625	19.35	12	11.9	25	24.8	:************
5	19.35	23.3375	14	13.9	39	38.6	:**************
6	23.3375	27.325	15	14.9	54	53.5	:***************
7	27.325	31.3125	13	12.9	67	66.3	:************
8	31.3125	35.3	11	10.9	78	77.2	:**********
9	35.3	39.2875	13	12.9	91	90.1	:************
10	39.2875	43.275	4	4.0	95	94.1	:****
11	43.275	47.2625	2	2.0	97	96.0	:**
12	47.2625	51.25	1	1.0	98	97.0	:*
13	51.25	55.2375	0	0.0	98	97.0	:
14	55.2375	59.225	2	2.0	100	99.0	:**
15	59.225	63.2125	0	0.0	100	99.0	:
16	63.2125	67.2	1	1.0	101	100.0	:*

----------Descriptive Statistics----------

Detail Report

Variable: OCHRO-B1 Blood thiamine OCHRO method

Break: LEVL-SO4 = 2

Mean - Average	22.88333	No. observations	72
Lower 95% c.i.limit	20.91067	No. missing values	0
Upper 95% c.i.limit	24.856	Sum of frequencies	72
Adj sum of squares	5003.52	Sum of observations	1647.6
Standard deviation	8.394767	Std.error of mean	.9893328
Variance	70.47212	T-value for mean=0	23.13007
Coef. of variation	.3668507	T prob level	0.0000
Skewness	.5872025	Kurtosis	.821593
Normality Test Value	1.079	Reject if > 1.068(10%)	1.106(5%)
100-%tile (Maximum)	47.8	90-%tile	32.1
75-%tile	27.95	10-%tile	12.4
50-%tile (Median)	22.75	Range	41.7
25-%tile	17.65	75th-25th %tile	10.3
0-%tile (Minimum)	6.1		

6.1----------Line Plot / Box Plot----------47.8
11 1 1 2 32 24 122121422 335 2311 13 322 11 11 1 1 1 1
----------[XXXXXXXXmXXXXXXXXX]--------

Distribution & Histogram

Variable: OCHRO-B1

Break: LEVL-SO4 = 2

Bin	Lower	Upper	Count	Prcnt	Total	Prcnt	Histogram
1	6.1	9.078571	2	2.8	2	2.8	:**
2	9.078571	12.05714	4	5.6	6	8.3	:****
3	12.05714	15.03572	5	6.9	11	15.3	:*****
4	15.03572	18.01429	9	12.5	20	27.8	:*********
5	18.01429	20.99286	10	13.9	30	41.7	:**********
6	20.99286	23.97143	13	18.1	43	59.7	:*************
7	23.97143	26.95	9	12.5	52	72.2	:*********
8	26.95	29.92857	8	11.1	60	83.3	:********
9	29.92857	32.90714	5	6.9	65	90.3	:*****
10	32.90714	35.88571	3	4.2	68	94.4	:***
11	35.88571	38.86429	1	1.4	69	95.8	:*
12	38.86429	41.84286	0	0.0	69	95.8	:
13	41.84286	44.82143	1	1.4	70	97.2	:*
14	44.82143	47.8	2	2.8	72	100.0	:**

----------Descriptive Statistics----------

Detail Report

Variable: OCHRO-B1 Blood thiamine OCHRO method

Break: LEVL-SO4 = 3

Mean - Average	23.12917	No. observations	48
Lower 95% c.i.limit	20.78827	No. missing values	0
Upper 95% c.i.limit	25.47007	Sum of frequencies	48
Adj sum of squares	3054.719	Sum of observations	1110.2
Standard deviation	8.061887	Std.error of mean	1.163633
Variance	64.99403	T-value for mean=0	19.87668
Coef. of variation	.3485594	T prob level	0.0000
Skewness	.272204	Kurtosis	-.7587702
Normality Test Value	0.965	Reject if > 1.098(10%)	1.151(5%)
100-%tile (Maximum)	41.7	90-%tile	32.7
75-%tile	29.7	10-%tile	12.7
50-%tile (Median)	23.05	Range	32.8
25-%tile	16.1	75th-25th %tile	13.6
0-%tile (Minimum)	8.9		

8.9----------Line Plot / Box Plot----------41.7
1 1 1 2 1112 2 21 21 112 1 31 11 1122 1 1231 1 1 1 1
1
--------[XXXXXXXXXXXXXXXmXXXXXXXXXXXXX]--------

Distribution & Histogram

Variable: OCHRO-B1
Break: LEVL-SO4 = 3

Bin	Lower	Upper	Count	Prcnt	Total	Prcnt	Histogram
1	8.9	11.42308	2	4.2	2	4.2	:**
2	11.42308	13.94615	5	10.4	7	14.6	:*****
3	13.94615	16.46923	6	12.5	13	27.1	:******
4	16.46923	18.99231	4	8.3	17	35.4	:****
5	18.99231	21.51538	5	10.4	22	45.8	:*****
6	21.51538	24.03846	5	10.4	27	56.3	:*****
7	24.03846	26.56154	3	6.3	30	62.5	:***
8	26.56154	29.08462	6	12.5	36	75.0	:******
9	29.08462	31.60769	5	10.4	41	85.4	:*****
10	31.60769	34.13077	3	6.3	44	91.7	:***
11	34.13077	36.65385	2	4.2	46	95.8	:**
12	36.65385	39.17693	1	2.1	47	97.9	:*
13	39.17693	41.70001	1	2.1	48	100.0	:*

----------Descriptive Statistics----------

Detail Report

Variable: LACTO-B1 Blood thiamine LACTO method

Mean - Average	31.61842	No. observations	221
Lower 95% c.i.limit	30.27003	No. missing values	0
Upper 95% c.i.limit	32.96681	Sum of frequencies	221
Adj sum of squares	23011.79	Sum of observations	6987.67
Standard deviation	10.22737	Std.error of mean	.6879672
Variance	104.599	T-value for mean=0	45.95919
Coef. of variation	.3234624	T prob level	0.0000
Skewness	.3515199	Kurtosis	1.080955
Normality Test Value	1.091	Reject if > 1.025(10%)	1.040(5%)
100-%tile (Maximum)	67.8	90-%tile	43.6
75-%tile	37.4	10-%tile	18.5
50-%tile (Median)	31.7	Range	63
25-%tile	25.6	75th-25th %tile	11.8
0-%tile (Minimum)	4.8		

4.8----------Line Plot / Box Plot----------67.8
1 1 1 122 2313164534433497357 8A95AA73E6955532222 32 3211 21 1 1
2
---------[XXXXXXmXXXXXX]--------

Distribution & Histogram

Variable: LACTO-B1

Bin	Lower	Upper	Count	Prcnt	Total	Prcnt	Histogram
1	4.8	8.3	3	1.4	3	1.4	:**
2	8.3	11.8	1	0.5	4	1.8	:*
3	11.8	15.3	6	2.7	10	4.5	:***
4	15.3	18.8	13	5.9	23	10.4	:*******
5	18.8	22.3	17	7.7	40	18.1	:*********
6	22.3	25.8	19	8.6	59	26.7	:**********
7	25.8	29.3	26	11.8	85	38.5	:**************
8	29.3	32.8	34	15.4	119	53.8	:******************
9	32.8	36.3	38	17.2	157	71.0	:********************
10	36.3	39.8	29	13.1	186	84.2	:***************
11	39.8	43.3	12	5.4	198	89.6	:******
12	43.3	46.8	9	4.1	207	93.7	:*****
13	46.8	50.3	6	2.7	213	96.4	:***
14	50.3	53.8	4	1.8	217	98.2	:**
15	53.8	57.3	1	0.5	218	98.6	:*
16	57.3	60.8	0	0.0	218	98.6	:
17	60.8	64.3	1	0.5	219	99.1	:*
18	64.3	67.8	2	0.9	221	100.0	:*

----------Descriptive Statistics----------

Detail Report

Variable: LACTO-B1 Blood thiamine LACTO method
Break: LEVL-SO4 = 1

Mean - Average	33.03663	No. observations	101
Lower 95% c.i.limit	30.68385	No. missing values	0
Upper 95% c.i.limit	35.38942	Sum of frequencies	101
Adj sum of squares	14204.13	Sum of observations	3336.7
Standard deviation	11.91811	Std.error of mean	1.185896
Variance	142.0414	T-value for mean=0	27.85795
Coef. of variation	.3607544	T prob level	0.0000
Skewness	.3430412	Kurtosis	.8009402
Normality Test Value	1.090	Reject if > 1.051(10%)	1.079(5%)
100-%tile (Maximum)	67.8	90-%tile	48.5
75-%tile	39.3	10-%tile	19.35
50-%tile (Median)	32.7	Range	63
25-%tile	25.8	75th-25th %tile	13.5
0-%tile (Minimum)	4.8		

4.8----------Line Plot / Box Plot----------67.8
1 1 1 1 1 1 111323 3131322213642314175312422 1 21 22 1 11 1 1
--------[XXXXXXXmXXXXXXX]----------

Distribution & Histogram

Variable: LACTO-B1
Break: LEVL-SO4 = 1

Bin	Lower	Upper	Count	Prcnt	Total	Prcnt	Histogram
1	4.8	8.7375	3	3.0	3	3.0	:***
2	8.7375	12.675	1	1.0	4	4.0	:*
3	12.675	16.6125	2	2.0	6	5.9	:**
4	16.6125	20.55	8	7.9	14	13.9	:********
5	20.55	24.4875	10	9.9	24	23.8	:**********
6	24.4875	28.425	9	8.9	33	32.7	:*********
7	28.425	32.3625	17	16.8	50	49.5	:*****************
8	32.3625	36.3	12	11.9	62	61.4	:************
9	36.3	40.2375	16	15.8	78	77.2	:****************
10	40.2375	44.175	8	7.9	86	85.1	:********
11	44.175	48.1125	4	4.0	90	89.1	:****
12	48.1125	52.05	5	5.0	95	94.1	:*****
13	52.05	55.9875	2	2.0	97	96.0	:**
14	55.9875	59.925	1	1.0	98	97.0	:*
15	59.925	63.8625	1	1.0	99	98.0	:*
16	63.8625	67.8	2	2.0	101	100.0	:**

----------Descriptive Statistics----------

Detail Report

Variable: LACTO-B1 Blood thiamine LACTO method
Break: LEVL-SO4 = 2

Mean - Average	30.54681	No. observations	72
Lower 95% c.i.limit	28.63005	No. missing values	0
Upper 95% c.i.limit	32.46356	Sum of frequencies	72
Adj sum of squares	4723.891	Sum of observations	2199.37
Standard deviation	8.156817	Std.error of mean	.9612902
Variance	66.53368	T-value for mean=0	31.77688
Coef. of variation	.2670269	T prob level	0.0000
Skewness	.131459	Kurtosis	.581203
Normality Test Value	1.080	Reject if > 1.068(10%)	1.106(5%)
100-%tile (Maximum)	52.7	90-%tile	39.3
75-%tile	34.7	10-%tile	18.8
50-%tile (Median)	30.7	Range	40.7
25-%tile	26.2	75th-25th %tile	8.499996
0-%tile (Minimum)	12		

12----------Line Plot / Box Plot----------52.7
11 2 22 11 2 1 112212 242412241 541213 2111 1 1 1 1 1 1
1
----------[XXXXXXXmXXXXXXX]--------

Distribution & Histogram

Variable: LACTO-B1
Break: LEVL-SO4 = 2

Bin	Lower	Upper	Count	Prcnt	Total	Prcnt	Histogram
1	12	14.90714	2	2.8	2	2.8	:**
2	14.90714	17.81429	2	2.8	4	5.6	:**
3	17.81429	20.72143	6	8.3	10	13.9	:******
4	20.72143	23.62857	3	4.2	13	18.1	:***
5	23.62857	26.53571	7	9.7	20	27.8	:*******
6	26.53571	29.44286	10	13.9	30	41.7	:**********
7	29.44286	32.35	14	19.4	44	61.1	:**************
8	32.35	35.25714	12	16.7	56	77.8	:************
9	35.25714	38.16428	6	8.3	62	86.1	:******
10	38.16428	41.07143	4	5.6	66	91.7	:****
11	41.07143	43.97857	2	2.8	68	94.4	:**
12	43.97857	46.88572	1	1.4	69	95.8	:*
13	46.88572	49.79286	1	1.4	70	97.2	:*
14	49.79286	52.7	2	2.8	72	100.0	:**

----------Descriptive Statistics----------

Detail Report

Variable: LACTO-B1 Blood thiamine LACTO method

Break: LEVL-SO4 = 3

Mean - Average	30.24167	No. observations	48
Lower 95% c.i.limit	27.66294	No. missing values	0
Upper 95% c.i.limit	32.8204	Sum of frequencies	48
Adj sum of squares	3706.957	Sum of observations	1451.6
Standard deviation	8.880959	Std.error of mean	1.281856
Variance	78.87142	T-value for mean=0	23.59209
Coef. of variation	.2936663	T prob level	0.0000
Skewness	-.3130353	Kurtosis	-.935154
Normality Test Value	0.959	Reject if > 1.098(10%)	1.151(5%)
100-%tile (Maximum)	45.6	90-%tile	39.35
75-%tile	37.6	10-%tile	16.6
50-%tile (Median)	32.75	Range	33.6
25-%tile	23.05	75th-25th %tile	14.55
0-%tile (Minimum)	12		

12----------Line Plot / Box Plot----------45.6
1 1 1 111 1 1 1 11 11 1 112 1 1 1 1 1 2113 1 31 121221 11 1
1
----------[XXXXXXXXXXXXXXXaXXXXXmXXXXXXXXXX]----

Distribution & Histogram

Variable: LACTO-B1
Break: LEVL-SO4 = 3

Bin	Lower	Upper	Count	Prcnt	Total	Prcnt	Histogram
1	12	14.58462	1	2.1	1	2.1	:*
2	14.58462	17.16923	4	8.3	5	10.4	:****
3	17.16923	19.75385	3	6.3	8	16.7	:***
4	19.75385	22.33846	3	6.3	11	22.9	:***
5	22.33846	24.92308	3	6.3	14	29.2	:***
6	24.92308	27.50769	5	10.4	19	39.6	:*****
7	27.50769	30.09231	2	4.2	21	43.8	:**
8	30.09231	32.67692	2	4.2	23	47.9	:**
9	32.67692	35.26154	8	16.7	31	64.6	:********
10	35.26154	37.84615	6	12.5	37	77.1	:******
11	37.84615	40.43077	7	14.6	44	91.7	:*******
12	40.43077	43.01538	1	2.1	45	93.8	:*
13	43.01538	45.6	3	6.3	48	100.0	:***

APPENDIX 2: REGIONAL DISTRIBUTION

Date/Time 04-27-1990 14:19:59 1=south, 2=central, 3=north

Data Base Name C:/survey\Demograf
Description Data created at 16:55:02 on 22-04-1990

Expected Mean Squares ... Balanced Case

Source	DF	Expectation of Mean Square (S stands for ERROR).
A	2	S+nA
S	218	S

Analysis of Variance Report

ANOVA Table for Response Variable: OCHRO-B1

Source	DF	Sum-Squares	Mean Square	F-Ratio	Prob>F	Error Term
A (REGION)	2	877.2977	438.6489	4.44	0.0128	ERROR
ERROR	218	21521.59	98.72291			
TOTAL(Adj)	220	22398.89				

Means & Standard Errors for Y = OCHRO-B1

TermCount	Mean	Std.Error
ALL 221	24.67551	
A: REGION		
1 41	24.52439	1.551733
2 83	22.54338	1.090611
3 97	26.95877	1.008842

GLM ANOVA (Variable Labels)

:/survey\Demograf LSD Comparison Report
Response Variable: OCHRO-B1 Factor(A,REGION) Error Term: ERROR

Summary Results 05 Level Codes

Code(Level)	Mean	ABC
A(2)	22.54338	..S
B(1)	24.52439	...
C(3)	26.95877	S..

Analysis of Variance Report

ANOVA Table for Response Variable: LACTO-B1

Source	DF	Sum-Squares	Mean Square	F-Ratio	Prob>F	Error Term
A (REGION)	2	576.9724	288.4862	2.80	0.0628	ERROR
ERROR	218	22434.82	102.912			
TOTAL(Adj)	220	23011.79				

Means & Standard Errors for Y = LACTO-B1

Term	Count	Mean	Std.Error
ALL	221	31.65912	
A: REGION			
1	41	32.3439	1.584313
2	83	29.56265	1.11351
3	97	33.07082	1.030024

Filter: **REGION = 1**

Analysis of Variance Report

ANOVA Table for Response Variable: **OCHRO-B1**

Source	DF	Sum-Squares	Mean Square	F-Ratio	Prob>F	Error Term
A (LEVL-SO4)	2	1540.08	770.0399	6.73	0.0031	ERROR
ERROR	38	4345.336	114.3509			
TOTAL(Adj)	40	5885.416				

Means & Standard Errors for Y = OCHRO-B1

TermCount		Mean	Std.Error
ALL	41	24.21009	
A: LEVL-SO4			
1	18	30.61111	2.520482
2	15	16.90667	2.76105
3	8	25.1125	3.780723

GLM ANOVA (Means & Standard Errors for Y = OCHRO-B1)

:/survey\Demograf Fisher's LSD Comparison Report

Response Variable: OCHRO-B1 Factor(A,LEVL-SO4) Error Term: ERROR

Summary Results 05 Level Codes

Code(Level)	Mean	ABC
A(2)	16.90667	..S
B(3)	25.1125	...
C(1)	30.61111	S..

Filter: REGION = 2

Analysis of Variance Report

ANOVA Table for Response Variable: OCHRO-B1

Source	DF	Sum-Squares	Mean Square	F-Ratio	Prob>F	Error Term
A (LEVL-SO4)	2	14.8921	7.446051	0.13	0.8756	ERROR
ERROR	80	4475.692	55.94615			
TOTAL(Adj)	82	4490.584				

Means & Standard Errors for Y = OCHRO-B1

TermCount	Mean	Std.Error
ALL 83	22.48089	
A: LEVL-SO4		
1 21	21.82381	1.632208
2 22	22.88636	1.594681
3 40	22.7325	1.182647

Filter: REGION = 3

Analysis of Variance Report

ANOVA Table for Response Variable: OCHRO-B1

Source	DF	Sum-Squares	Mean Square	F-Ratio	Prob>F	Error Term
A (LEVL-SO4)	1	125.8324	125.8324	1.08	0.3003	ERROR
ERROR	95	11019.76	115.9975			
TOTAL(Adj)	96	11145.59				

Filter: REGION = 3

Means & Standard Errors for Y = OCHRO-B1

TermCount	Mean	Std.Error
ALL 97	26.62869	
A: LEVL-SO4		
1 62	27.81452	1.367818
2 35	25.44286	1.820498

Filter: **REGION = 1**

Analysis of Variance Report

ANOVA Table for Response Variable: **LACTO-B1**

Source	DF	Sum-Squares	Mean Square	F-Ratio	Prob>F	Error Term
A (LEVL-SO4)	2	965.3256	482.6628	4.97	0.0121	ERROR
ERROR	38	3692.515	97.17146			
TOTAL(Adj)	40	4657.841				

Means & Standard Errors for Y = LACTO-B1

TermCount		Mean	Std.Error
ALL	41	31.72463	
A: LEVL-SO4			
1	18	37.62222	2.323449
2	15	26.92667	2.545211
3	8	30.625	3.485173

GLM ANOVA (Means & Standard Errors for Y = LACTO-B1)

:/survey\Demograf

Fisher's LSD Comparison Report

Response Variable: LACTO-B1 Factor(A,LEVL-SO4) Error Term: ERROR

Summary Results 05 Level Codes

Code(Level)	Mean	ABC
A(2)	26.92667	..S
B(3)	30.625	...
C(1)	37.62222	S..

Filter: **REGION = 2**

Analysis of Variance Report

ANOVA Table for Response Variable: **LACTO-B1**

Source	DF	Sum-Squares	Mean Square	F-Ratio	Prob>F	Error Term
A (LEVL-SO4)	2	33.89421	16.94711	0.23	0.7958	ERROR
ERROR	80	5918.56	73.982			
TOTAL(Adj)	82	5952.454				

Means & Standard Errors for Y = LACTO-B1

TermCount		Mean	Std.Error
ALL	83	29.38415	
A: LEVL-SO4			
1	21	28.62381	1.876953
2	22	29.36364	1.833799
3	40	30.165	1.359982

Filter: **REGION = 3**

Analysis of Variance Report

ANOVA Table for Response Variable: **LACTO-B1**

Source	DF	Sum-Squares	Mean Square	F-Ratio	Prob>F	Error Term
A (LEVL-SO4)	1	2.867174	2.867174	0.02	0.8797	ERROR
ERROR	95	11821.66	124.4385			
TOTAL(Adj)	96	11824.52				

Means & Standard Errors for Y = LACTO-B1

TermCount		Mean	Std.Error
ALL	97	33.021	
A: LEVL-SO4			
1	62	33.2	1.416712
2	35	32.842	1.885573

APPENDIX 3: BEEF CATTLE STUDY

GLM ANOVA

SO4 level

Date/Time 04-24-1990 22:10:44
Data Base Name C:/survey\beef
Description Data base created at 10:17:25 on 04-23-1990

1=low (<200ppm)
2=high (>1000ppm)

Expected Mean Squares ... Balanced Case

Source	DF	Expectation of Mean Square (S stands for ERROR).
A	1	S+nA
S	398	S

Analysis of Variance Report

ANOVA Table for Response Variable: OCHRO-B1

Source	DF	Sum-Squares	Mean Square	F-Ratio	Prob>F	Error Term
A (LVEL-SO4)	1	8726.296	8726.296	69.74	0.0000	ERROR
ERROR	398	49802.88	125.1329			
TOTAL(Adj)	399	58529.18				

Means & Standard Errors for Y = OCHRO-B1

TermCount	Mean	Std.Error
ALL 400	42.60811	
A: LVEL-SO4		
1 199	47.2789	.7929744
2 201	37.93731	.7890194

Analysis of Variance Report

ANOVA Table for Response Variable: LACTO-B1

Source	DF	Sum-Squares	Mean Square	F-Ratio	Prob>F	Error Term
A (LVEL-SO4)	1	7134.44	7134.44	46.73	0.0000	ERROR
ERROR	398	60764.77	152.6753			
TOTAL(Adj)	399	67899.21				

Means & Standard Errors for Y = LACTO-B1

TermCount	Mean	Std.Error
ALL 400	49.28169	
A: LVEL-SO4		
1 199	53.50503	.8759068
2 201	45.05836	.8715381

----------Descriptive Statistics----------

Detail Report

Variable: OCHRO-B1 Blood thiamine OCHRO method

Filter: LVEL-SO4 = 1 Break: LVEL-SO4 = 1

Mean - Average	47.2789	No. observations	200
Lower 95% c.i.limit	45.90399	No. missing values	1
Upper 95% c.i.limit	48.6538	Sum of frequencies	199
Adj sum of squares	19152.87	Sum of observations	9408.5
Standard deviation	9.835226	Std.error of mean	.6972007
Variance	96.73167	T-value for mean=0	67.81246
Coef. of variation	.2080257	T prob level	0.0000
Skewness	.219507	Kurtosis	-6.604257E-02
Normality Test Value	0.981	Reject if > 1.027(10%)	1.044(5%)
100-%tile (Maximum)	75.6	90-%tile	59.8
75-%tile	53.1	10-%tile	34.8
50-%tile (Median)	46.8	Range	54.6
25-%tile	40.3	75th-25th %tile	12.8
0-%tile (Minimum)	21		

21----------Line Plot / Box Plot----------75.6
1 1 1 1111 432161834216346765782575567558313351424413 12 21211 1 1111
1

--------[XXXXXXXXmaXXXXXXX]---------

Distribution & Histogram

Variable: OCHRO-B1 Filter: LVEL-SO4 = 1
Break: LVEL-SO4 = 1

Bin	Lower	Upper	Count	Prcnt	Total	Prcnt	Histogram
1	21	24.03333	1	0.5	1	0.5	:*
2	24.03333	27.06667	2	1.0	3	1.5	:*
3	27.06667	30.1	2	1.0	5	2.5	:*
4	30.1	33.13333	8	4.0	13	6.5	:****
5	33.13333	36.16666	12	6.0	25	12.6	:******
6	36.16666	39.2	16	8.0	41	20.6	:********
7	39.2	42.23333	20	10.1	61	30.7	:**********
8	42.23333	45.26667	26	13.1	87	43.7	:*************
9	45.26667	48.3	22	11.1	109	54.8	:**********
10	48.3	51.33333	27	13.6	136	68.3	:**************
11	51.33333	54.36667	20	10.1	156	78.4	:**********
12	54.36667	57.4	11	5.5	167	83.9	:******
13	57.4	60.43333	13	6.5	180	90.5	:*******
14	60.43333	63.46667	7	3.5	187	94.0	:****
15	63.46667	66.5	6	3.0	193	97.0	:***
16	66.5	69.53333	2	1.0	195	98.0	:*
17	69.53333	72.56667	3	1.5	198	99.5	:**
18	72.56667	75.6	1	0.5	199	100.0	:*

Detail Report

Variable: OCHRO-B1 Blood thiamine OCHRO method

Filter: LVEL-SO4 = 2 Break: LVEL-SO4 = 2

Mean - Average	37.93731	No. observations	201
Lower 95% c.i.limit	36.21557	No. missing values	0
Upper 95% c.i.limit	39.65906	Sum of frequencies	201
Adj sum of squares	30650.01	Sum of observations	7625.4
Standard deviation	12.37942	Std.error of mean	.873177
Variance	153.25	T-value for mean=0	43.44745
Coef. of variation	.3263125	T prob level	0.0000
Skewness	-.4534735	Kurtosis	.7386774
Normality Test Value	1.110	Reject if > 1.027(10%)	1.043(5%)
100-%tile (Maximum)	72.1	90-%tile	52.8
75-%tile	45.3	10-%tile	21.4
50-%tile (Median)	38.4	Range	69.6
25-%tile	32.1	75th-25th %tile	13.2
0-%tile (Minimum)	2.5		

2.5----------Line Plot / Box Plot----------72.1
1 22 1 1311 21 221115 2323314966623GB294B2A6742646 243 7 211 2 1
1
----------[XXXXXXmXXXXXXX]--------

Distribution & Histogram

Variable: OCHRO-B1 Filter: LVEL-SO4 = 2
Break: LVEL-SO4 = 2

Bin	Lower	Upper	Count	Prcnt	Total	Prcnt	Histogram
1	2.5	6.366667	5	2.5	5	2.5	:***
2	6.366667	10.23333	1	0.5	6	3.0	:*
3	10.23333	14.1	6	3.0	12	6.0	:***
4	14.1	17.96667	2	1.0	14	7.0	:*
5	17.96667	21.83333	7	3.5	21	10.4	:****
6	21.83333	25.7	7	3.5	28	13.9	:****
7	25.7	29.56667	12	6.0	40	19.9	:******
8	29.56667	33.43333	22	10.9	62	30.8	:**********
9	33.43333	37.3	19	9.5	81	40.3	:**********
10	37.3	41.16666	37	18.4	118	58.7	:**********
11	41.16666	45.03333	31	15.4	149	74.1	:**********
12	45.03333	48.9	21	10.4	170	84.6	:**********
13	48.9	52.76667	10	5.0	180	89.6	:*****
14	52.76667	56.63333	7	3.5	187	93.0	:****
15	56.63333	60.5	9	4.5	196	97.5	:*****
16	60.5	64.36667	3	1.5	199	99.0	:**
17	64.36667	68.23333	0	0.0	199	99.0	:
18	68.23333	72.1	2	1.0	201	100.0	:*

Detail Report

Variable: LACTO-B1 Blood thiamine LACTO method

Filter: LVEL-SO4 = 1		Break: LVEL-SO4 = 1	
Mean - Average	53.50502	No. observations	200
Lower 95% c.i.limit	51.95666	No. missing values	1
Upper 95% c.i.limit	55.05339	Sum of frequencies	199
Adj sum of squares	24290.39	Sum of observations	10647.5
Standard deviation	11.07604	Std.error of mean	.78516
Variance	122.6788	T-value for mean=0	68.14538
Coef. of variation	.2070094	T prob level	0.0000
Skewness	.2111288	Kurtosis	-6.482735E-02
Normality Test Value	0.986	Reject if > 1.027(10%)	1.044(5%)
100-%tile (Maximum)	85.5	90-%tile	67.85001
75-%tile	61.2	10-%tile	39.8
50-%tile (Median)	52.8	Range	64.4
25-%tile	45.5	75th-25th %tile	15.7
0-%tile (Minimum)	21.1		

```
21.1------------------------Line Plot / Box Plot--------------------------85.5
1            13212 133141626754662 5A9737466633625463143 5341 1331112   1 2
1
                      -------[XXXXXXXmaXXXXXXXXX]--------
```

Distribution & Histogram

Variable: LACTO-B1 Filter: LVEL-SO4 = 1
Break: LVEL-SO4 = 1

Bin	Lower	Upper	Count	Prcnt	Total	Prcnt	Histogram
1	21.1	24.67778	1	0.5	1	0.5	:*
2	24.67778	28.25556	0	0.0	1	0.5	:
3	28.25556	31.83333	1	0.5	2	1.0	:*
4	31.83333	35.41111	6	3.0	8	4.0	:***
5	35.41111	38.98889	9	4.5	17	8.5	:*****
6	38.98889	42.56667	14	7.0	31	15.6	:*******
7	42.56667	46.14445	22	11.1	53	26.6	:**********
8	46.14445	49.72222	23	11.6	76	38.2	:**********
9	49.72222	53.3	29	14.6	105	52.8	:**********
10	53.3	56.87778	25	12.6	130	65.3	:**********
11	56.87778	60.45556	14	7.0	144	72.4	:*******
12	60.45556	64.03333	19	9.5	163	81.9	:**********
13	64.03333	67.61112	14	7.0	177	88.9	:*******
14	67.61112	71.18889	8	4.0	185	93.0	:****
15	71.18889	74.76667	8	4.0	193	97.0	:****
16	74.76667	78.34444	2	1.0	195	98.0	:*
17	78.34444	81.92223	3	1.5	198	99.5	:**
18	81.92223	85.5	1	0.5	199	100.0	:*

Detail Report

Variable: LACTO-B1 Blood thiamine LACTO method

Filter: LVEL-SO4 = 2		Break: LVEL-SO4 = 2	
Mean - Average	45.05836	No. observations	201
Lower 95% c.i.limit	43.18013	No. missing values	0
Upper 95% c.i.limit	46.93659	Sum of frequencies	201
Adj sum of squares	36474.38	Sum of observations	9056.731
Standard deviation	13.50451	Std.error of mean	.9525349
Variance	182.3719	T-value for mean=0	47.30363
Coef. of variation	.2997116	T prob level	0.0000
Skewness	-3.841536E-02	Kurtosis	1.127694
Normality Test Value	1.115	Reject if > 1.027(10%)	1.043(5%)
100-%tile (Maximum)	98	90-%tile	60.7
75-%tile	52.8	10-%tile	26.75
50-%tile (Median)	46.2	Range	89.6
25-%tile	37.8	75th-25th %tile	15
0-%tile (Minimum)	8.4		

```
8.4-------------------------Line Plot / Box Plot----------------------------98
1   2131213  112411 3226756859974E97A556666423443 111 1 121  1
1
                ----------[XXXXXamXXXXX]-------
```

Distribution & Histogram

Variable: LACTO-B1 Filter: LVEL-SO4 = 2
Break: LVEL-SO4 = 2

Bin	Lower	Upper	Count	Prcnt	Total	Prcnt	Histogram
1	8.4	13.37778	1	0.5	1	0.5	:*
2	13.37778	18.35555	9	4.5	10	5.0	:*****
3	18.35555	23.33333	5	2.5	15	7.5	:***
4	23.33333	28.31111	8	4.0	23	11.4	:****
5	28.31111	33.28889	6	3.0	29	14.4	:***
6	33.28889	38.26666	24	11.9	53	26.4	:************
7	38.26666	43.24445	32	15.9	85	42.3	:****************
8	43.24445	48.22222	37	18.4	122	60.7	:********************
9	48.22222	53.2	31	15.4	153	76.1	:****************
10	53.2	58.17777	21	10.4	174	86.6	:**********
11	58.17777	63.15556	14	7.0	188	93.5	:*******
12	63.15556	68.13333	6	3.0	194	96.5	:***
13	68.13333	73.11111	1	0.5	195	97.0	:*
14	73.11111	78.08889	4	2.0	199	99.0	:**
15	78.08889	83.06667	1	0.5	200	99.5	:*
16	83.06667	88.04444	0	0.0	200	99.5	:
17	88.04444	93.02222	0	0.0	200	99.5	:
18	93.02222	97.99999	1	0.5	201	100.0	:*

APPENDIX 4: DAIRY STUDY

----------GLM ANOVA----------

Date/Time 04-24-1990 00:46:17
Data Base Name C:/survey\dairy
Description Data base created at 11:45:11 on 04-19-1990

Filter: SAMPLING = 1

Expected Mean Squares ... Balanced Case

Source	DF	Expectation of Mean Square (S stands for ERROR).
A	1	S+nA
S	94	S

Filter: SAMPLING = 1

Analysis of Variance Report

ANOVA Table for Response Variable: OCHRO-B1

Source	DF	Sum-Squares	Mean Square	F-Ratio	Prob>F	Error Term
A (LVEL-SO4)	1	34.67583	34.67583	0.56	0.4579	ERROR
ERROR	94	5867.611	62.4214			
TOTAL(Adj)	95	5902.288				

Means & Standard Errors for Y = OCHRO-B1

Term	Count	Mean	Std.Error
ALL	96	17.70572	
A: LVEL-SO4			
1	33	17.07303	1.375339
2	63	18.33841	.9953973

Filter: SAMPLING = 2

Analysis of Variance Report

ANOVA Table for Response Variable: OCHRO-B1

Source	DF	Sum-Squares	Mean Square	F-Ratio	Prob>F	Error Term
A (LVEL-SO4)	1	304.1554	304.1554	2.35	0.1283	ERROR
ERROR	95	12273.21	129.1916			
TOTAL(Adj)	96	12577.36				

Means & Standard Errors for Y = OCHRO-B1

Term	Count	Mean	Std.Error
ALL	97	31.12029	
A: LVEL-SO4			
1	33	29.25151	1.97861
2	64	32.98906	1.420781

Filter: SAMPLING = 3

Analysis of Variance Report

ANOVA Table for Response Variable: OCHRO-B1

Source	DF	Sum-Squares	Mean Square	F-Ratio	Prob>F	Error Term
A (LVEL-SO4)	1	873.6246	873.6246	5.43	0.0221	ERROR
ERROR	90	14488.38	160.9819			
TOTAL(Adj)	91	15362				

Means & Standard Errors for Y = OCHRO-B1

Term	Count	Mean	Std.Error
ALL	92	32.15677	
A: LVEL-SO4			
1	30	28.87	2.316477
2	62	35.44355	1.611361

Filter: SAMPLING = 4

Analysis of Variance Report

ANOVA Table for Response Variable: OCHRO-B1

Source	DF	Sum-Squares	Mean Square	F-Ratio	Prob>F	Error Term
A (LVEL-SO4)	1	657.2385	657.2385	4.25	0.0422	ERROR
ERROR	92	14240.74	154.7906			
TOTAL(Adj)	93	14897.98				

Means & Standard Errors for Y = OCHRO-B1

Term	Count	Mean	Std.Error
ALL	94	34.1751	
A: LVEL-SO4			
1	34	31.42353	2.133698
2	60	36.92667	1.606189

Filter: SAMPLING = 1

Analysis of Variance Report

ANOVA Table for Response Variable: LACTO-B1

Source	DF	Sum-Squares	Mean Square	F-Ratio	Prob>F	Error Term
A (LVEL-SO4)	1	16.68985	16.68985	0.19	0.6669	ERROR
ERROR	94	8414.58	89.51681			
TOTAL(Adj)	95	8431.27				

Means & Standard Errors for Y = LACTO-B1

TermCount	Mean	Std.Error
ALL 96	24.25106	
A: LVEL-SO4		
1 33	23.81212	1.647007
2 63	24.69	1.192016

Filter: SAMPLING = 2

Analysis of Variance Report

ANOVA Table for Response Variable: LACTO-B1

Source	DF	Sum-Squares	Mean Square	F-Ratio	Prob>F	Error Term
A (LVEL-SO4)	1	532.8856	532.8856	3.31	0.0720	ERROR
ERROR	95	15289.09	160.9377			
TOTAL(Adj)	96	15821.97				

Means & Standard Errors for Y = LACTO-B1

TermCount	Mean	Std.Error
ALL 97	37.38267	
A: LVEL-SO4		
1 33	34.90909	2.208371
2 64	39.85625	1.585765

Filter: SAMPLING = 3

Analysis of Variance Report

ANOVA Table for Response Variable: LACTO-B1

Source	DF	Sum-Squares	Mean Square	F-Ratio	Prob>F	Error Term
A (LVEL-SO4)	1	1257.238	1257.238	5.12	0.0260	ERROR
ERROR	90	22084.65	245.385			
TOTAL(Adj)	91	23341.89				

Means & Standard Errors for Y = LACTO-B1

TermCount	Mean	Std.Error
ALL 92	40.6829	
A: LVEL-SO4		
1 30	36.74	2.859983
2 62	44.62581	1.989428

Filter: SAMPLING = 4

Analysis of Variance Report

ANOVA Table for Response Variable: LACTO-B1

Source	DF	Sum-Squares	Mean Square	F-Ratio	Prob>F	Error Term
A (LVEL-SO4)	1	762.2702	762.2702	3.66	0.0589	ERROR
ERROR	92	19169.04	208.3591			
TOTAL(Adj)	93	19931.31				

Means & Standard Errors for Y = LACTO-B1

Term	Count	Mean	Std.Error
ALL	94	43.32505	
A: LVEL-SO4			
1	34	40.36176	2.475522
2	60	46.28833	1.863505

----------Descriptive Statistics----------

Detail Report

Variable: OCHRO-B1 Blood thiamine OCHRO method

Filter: SAMPLING = 1 Break: LVEL-SO4 = 1

Mean - Average	17.07303	No. observations	33
Lower 95% c.i.limit	14.29428	No. missing values	0
Upper 95% c.i.limit	19.85178	Sum of frequencies	33
Adj sum of squares	1965.252	Sum of observations	563.41
Standard deviation	7.836717	Std.error of mean	1.364197
Variance	61.41413	T-value for mean=0	12.51507
Coef. of variation	.4590115	T prob level	0.0000
Skewness	1.126503	Kurtosis	1.217072
Normality Test Value	1.325	Reject if > 1.136(10%)	1.208(5%)
100-%tile (Maximum)	38.4	90-%tile	29
75-%tile	18.4	10-%tile	9.2
50-%tile (Median)	16.2	Range	34
25-%tile	12.4	75th-25th %tile	6
0-%tile (Minimum)	4.4		

4.4----------Line Plot / Box Plot----------38.4

1 2 1 1 11112 21 1 321112 1 1 1 1 1 1 1 1

-------[XXXXXXXmXaXX]----------

Distribution & Histogram

Variable: OCHRO-B1 Filter: SAMPLING = 1
Break: LVEL-SO4 = 1

Bin	Lower	Upper	Count	Prcnt	Total	Prcnt	Histogram
1	4.4	7.233334	1	3.0	1	3.0	:*
2	7.233334	10.06667	3	9.1	4	12.1	:***
3	10.06667	12.9	6	18.2	10	30.3	:******
4	12.9	15.73333	5	15.2	15	45.5	:*****
5	15.73333	18.56667	10	30.3	25	75.8	:**********
6	18.56667	21.4	1	3.0	26	78.8	:*
7	21.4	24.23333	2	6.1	28	84.8	:**
8	24.23333	27.06667	1	3.0	29	87.9	:*
9	27.06667	29.9	1	3.0	30	90.9	:*
10	29.9	32.73333	1	3.0	31	93.9	:*
11	32.73333	35.56667	0	0.0	31	93.9	:
12	35.56667	38.4	2	6.1	33	100.0	:**

----------Descriptive Statistics----------

Detail Report

Variable: OCHRO-B1 Blood thiamine OCHRO method

Filter: SAMPLING = 1 Break: LVEL-SO4 = 2

Mean - Average	18.33841	No. observations	64
Lower 95% c.i.limit	16.34038	No. missing values	1
Upper 95% c.i.limit	20.33645	Sum of frequencies	63
Adj sum of squares	3902.359	Sum of observations	1155.32
Standard deviation	7.933554	Std.error of mean	.9995339
Variance	62.94128	T-value for mean=0	18.34696
Coef. of variation	.4326195	T prob level	0.0000
Skewness	.553106	Kurtosis	-.7121936
Normality Test Value	0.982	Reject if > 1.077(10%)	1.118(5%)
100-%tile (Maximum)	36.2	90-%tile	30.2
75-%tile	24.7	10-%tile	9.2
50-%tile (Median)	16.7	Range	32
25-%tile	12	75th-25th %tile	12.7
0-%tile (Minimum)	4.2		

4.2----------Line Plot / Box Plot----------36.2
1 1113 212211 2512 3 212 1211111 1 1212111 1 112 11 1 1 1
1
-------[XXXXXXXXXXmXXXaXXXXXXXXXXXXXXX]----------

Distribution & Histogram

Variable: OCHRO-B1 Filter: SAMPLING = 1
Break: LVEL-SO4 = 2

Bin	Lower	Upper	Count	Prcnt	Total	Prcnt	Histogram
1	4.2	6.485714	1	1.6	1	1.6	:*
2	6.485714	8.771429	2	3.2	3	4.8	:**
3	8.771429	11.05714	9	14.3	12	19.0	:*********
4	11.05714	13.34286	9	14.3	21	33.3	:*********
5	13.34286	15.62857	8	12.7	29	46.0	:********
6	15.62857	17.91429	6	9.5	35	55.6	:******
7	17.91429	20.2	7	11.1	42	66.7	:*******
8	20.2	22.48571	1	1.6	43	68.3	:*
9	22.48571	24.77143	5	7.9	48	76.2	:*****
10	24.77143	27.05714	4	6.3	52	82.5	:****
11	27.05714	29.34286	2	3.2	54	85.7	:**
12	29.34286	31.62857	5	7.9	59	93.7	:*****
13	31.62857	33.91429	2	3.2	61	96.8	:**
14	33.91429	36.2	2	3.2	63	100.0	:**

----------Descriptive Statistics----------

Detail Report

Variable: OCHRO-B1 Blood thiamine OCHRO method

Filter: SAMPLING = 2 Break: LVEL-SO4 = 1

Mean - Average	29.25151	No. observations	33
Lower 95% c.i.limit	25.82957	No. missing values	0
Upper 95% c.i.limit	32.67346	Sum of frequencies	33
Adj sum of squares	2980.323	Sum of observations	965.3
Standard deviation	9.650652	Std.error of mean	1.679963
Variance	93.13508	T-value for mean=0	17.412
Coef. of variation	.3299197	T prob level	0.0000
Skewness	.262401	Kurtosis	-.4025905
Normality Test Value	0.967	Reject if > 1.136(10%)	1.208(5%)
100-%tile (Maximum)	52.2	90-%tile	41.2
75-%tile	35.5	10-%tile	17
50-%tile (Median)	29.4	Range	38
25-%tile	19.7	75th-25th %tile	15.8
0-%tile (Minimum)	14.2		

14.2----------Line Plot / Box Plot----------52.2
1 1 1 3 1 11 1 11 1222 1 1 1 2 12 1 1 1 1 1 1
1
-----[XXXXXXXXXXXXXXXXXXmXXXXXXXXXXX]----------

Distribution & Histogram

Variable: OCHRO-B1 Filter: SAMPLING = 2
Break: LVEL-SO4 = 1

Bin	Lower	Upper	Count	Prcnt	Total	Prcnt	Histogram
1	14.2	17.36667	6	18.2	6	18.2	:******
2	17.36667	20.53333	3	9.1	9	27.3	:***
3	20.53333	23.7	1	3.0	10	30.3	:*
4	23.7	26.86667	2	6.1	12	36.4	:**
5	26.86667	30.03333	7	21.2	19	57.6	:*******
6	30.03333	33.2	2	6.1	21	63.6	:**
7	33.2	36.36667	6	18.2	27	81.8	:******
8	36.36667	39.53333	2	6.1	29	87.9	:**
9	39.53333	42.7	2	6.1	31	93.9	:**
10	42.7	45.86667	0	0.0	31	93.9	:
11	45.86667	49.03334	1	3.0	32	97.0	:*
12	49.03334	52.2	1	3.0	33	100.0	:*

----------Descriptive Statistics----------

Detail Report

Variable: OCHRO-B1 Blood thiamine OCHRO method

Filter: SAMPLING = 2 Break: LVEL-SO4 = 2

Mean - Average	32.98906	No. observations	64
Lower 95% c.i.limit	29.9553	No. missing values	0
Upper 95% c.i.limit	36.02283	Sum of frequencies	64
Adj sum of squares	9292.883	Sum of observations	2111.3
Standard deviation	12.14521	Std.error of mean	1.518151
Variance	147.5061	T-value for mean=0	21.72976
Coef. of variation	.3681586	T prob level	0.0000
Skewness	1.725373	Kurtosis	5.863625
Normality Test Value	1.521	Reject if > 1.076(10%)	1.117(5%)
100-%tile (Maximum)	88.2	90-%tile	48
75-%tile	38.45	10-%tile	20.1
50-%tile (Median)	30.7	Range	75.7
25-%tile	24.05	75th-25th %tile	14.4
0-%tile (Minimum)	12.5		

12.5----------Line Plot / Box Plot----------88.2
1 1 311 16421114332 41 53113111 1 211 1 1
1
----[XXXXXXmXaXXXXX]----------

Distribution & Histogram

Variable: OCHRO-B1 Filter: SAMPLING = 2
Break: LVEL-SO4 = 2

Bin	Lower	Upper	Count	Prcnt	Total	Prcnt	Histogram
1	12.5	17.90714	2	3.1	2	3.1	:**
2	17.90714	23.31429	11	17.2	13	20.3	:**********
3	23.31429	28.72143	13	20.3	26	40.6	:**********
4	28.72143	34.12857	12	18.8	38	59.4	:**********
5	34.12857	39.53571	11	17.2	49	76.6	:**********
6	39.53571	44.94286	7	10.9	56	87.5	:*******
7	44.94286	50.35	5	7.8	61	95.3	:*****
8	50.35	55.75714	1	1.6	62	96.9	:*
9	55.75714	61.16428	0	0.0	62	96.9	:
10	61.16428	66.57143	1	1.6	63	98.4	:*
11	66.57143	71.97857	0	0.0	63	98.4	:
12	71.97857	77.38571	0	0.0	63	98.4	:
13	77.38571	82.79285	0	0.0	63	98.4	:
14	82.79285	88.2	1	1.6	64	100.0	:*

----------Descriptive Statistics----------

Detail Report

Variable: OCHRO-B1 Blood thiamine OCHRO method

Filter: SAMPLING = 3 Break: LVEL-SO4 = 1

Mean - Average	28.87	No. observations	30
Lower 95% c.i.limit	22.89288	No. missing values	0
Upper 95% c.i.limit	34.84712	Sum of frequencies	30
Adj sum of squares	7431.263	Sum of observations	866.1
Standard deviation	16.00782	Std.error of mean	2.922616
Variance	256.2505	T-value for mean=0	9.878139
Coef. of variation	.5544795	T prob level	0.0000
Skewness	.9832894	Kurtosis	2.537185
Normality Test Value	1.197	Reject if > 1.149(10%)	1.228(5%)
100-%tile (Maximum)	80.9	90-%tile	45
75-%tile	37.6	10-%tile	9.8
50-%tile (Median)	29.7	Range	77.20001
25-%tile	16.2	75th-25th %tile	21.4
0-%tile (Minimum)	3.7		

3.7----------Line Plot / Box Plot----------80.9
2 1 1 11 11 1 2 1 2 1111121 1 12 1 1 1
1
-------[XXXXXXXXXXamXXXXXXX]--------

Distribution & Histogram

Variable: OCHRO-B1 Filter: SAMPLING = 3
Break: LVEL-SO4 = 1

Bin	Lower	Upper	Count	Prcnt	Total	Prcnt	Histogram
1	3.7	10.71818	4	13.3	4	13.3	:****
2	10.71818	17.73636	4	13.3	8	26.7	:****
3	17.73636	24.75455	4	13.3	12	40.0	:****
4	24.75455	31.77273	4	13.3	16	53.3	:****
5	31.77273	38.79091	7	23.3	23	76.7	:*******
6	38.79091	45.80909	4	13.3	27	90.0	:****
7	45.80909	52.82728	2	6.7	29	96.7	:**
8	52.82728	59.84546	0	0.0	29	96.7	:
9	59.84546	66.86364	0	0.0	29	96.7	:
10	66.86364	73.88182	0	0.0	29	96.7	:
11	73.88182	80.9	1	3.3	30	100.0	:*

----------Descriptive Statistics----------

Detail Report

Variable: OCHRO-B1 Blood thiamine OCHRO method

Filter: SAMPLING = 3 Break: LVEL-SO4 = 2

Mean - Average	35.44355	No. observations	62
Lower 95% c.i.limit	32.71207	No. missing values	0
Upper 95% c.i.limit	38.17503	Sum of frequencies	62
Adj sum of squares	7057.112	Sum of observations	2197.5
Standard deviation	10.75595	Std.error of mean	1.366006
Variance	115.6904	T-value for mean=0	25.94684
Coef. of variation	.303467	T prob level	0.0000
Skewness	.4666684	Kurtosis	.4587623
Normality Test Value	1.018	Reject if > 1.078(10%)	1.120(5%)
100-%tile (Maximum)	65.3	90-%tile	46.8
75-%tile	41.5	10-%tile	21.05
50-%tile (Median)	36.2	Range	49.6
25-%tile	26.7	75th-25th %tile	14.8
0-%tile (Minimum)	15.7		

15.7----------Line Plot / Box Plot----------65.3
2 1 13 11 23112 1 2111 4 21 314123131 13 11 2 1 1 11
---------[XXXXXXXXXXXXamXXXXXXX]--------

Distribution & Histogram

Variable: OCHRO-B1 Filter: SAMPLING = 3
Break: LVEL-SO4 = 2

Bin	Lower	Upper	Count	Prcnt	Total	Prcnt	Histogram
1	15.7	19.24286	3	4.8	3	4.8	:***
2	19.24286	22.78572	5	8.1	8	12.9	:*****
3	22.78572	26.32857	7	11.3	15	24.2	:*******
4	26.32857	29.87143	4	6.5	19	30.6	:****
5	29.87143	33.41429	6	9.7	25	40.3	:******
6	33.41429	36.95715	6	9.7	31	50.0	:******
7	36.95715	40.5	13	21.0	44	71.0	:*************
8	40.5	44.04286	6	9.7	50	80.6	:******
9	44.04286	47.58572	6	9.7	56	90.3	:******
10	47.58572	51.12857	3	4.8	59	95.2	:***
11	51.12857	54.67143	0	0.0	59	95.2	:
12	54.67143	58.21429	1	1.6	60	96.8	:*
13	58.21429	61.75715	0	0.0	60	96.8	:
14	61.75715	65.3	2	3.2	62	100.0	:**

----------Descriptive Statistics----------

Detail Report

Variable: OCHRO-B1 Blood thiamine OCHRO method

Filter: SAMPLING = 4 Break: LVEL-SO4 = 1

Mean - Average	31.42353	No. observations	34
Lower 95% c.i.limit	26.49622	No. missing values	0
Upper 95% c.i.limit	36.35084	Sum of frequencies	34
Adj sum of squares	6581.441	Sum of observations	1068.4
Standard deviation	14.12224	Std.error of mean	2.421944
Variance	199.4376	T-value for mean=0	12.97451
Coef. of variation	.449416	T prob level	0.0000
Skewness	.9154245	Kurtosis	3.171
Normality Test Value	1.448	Reject if > 1.133(10%)	1.202(5%)
100-%tile (Maximum)	79.5	90-%tile	47.3
75-%tile	36	10-%tile	17.5
50-%tile (Median)	29.7	Range	76
25-%tile	23.5	75th-25th %tile	12.5
0-%tile (Minimum)	3.5		

3.5----------Line Plot / Box Plot----------79.5
1 1 1 1 111111 2 422121 2 22 1 11
1
-------[XXXXXmXaXXX]----------

Distribution & Histogram

Variable: OCHRO-B1 Filter: SAMPLING = 4
Break: LVEL-SO4 = 1

Bin	Lower	Upper	Count	Prcnt	Total	Prcnt	Histogram
1	3.5	9.833334	2	5.9	2	5.9	:**
2	9.833334	16.16667	1	2.9	3	8.8	:*
3	16.16667	22.5	4	11.8	7	20.6	:****
4	22.5	28.83333	5	14.7	12	35.3	:*****
5	28.83333	35.16667	12	35.3	24	70.6	:************
6	35.16667	41.5	2	5.9	26	76.5	:**
7	41.5	47.83334	5	14.7	31	91.2	:*****
8	47.83334	54.16667	2	5.9	33	97.1	:**
9	54.16667	60.5	0	0.0	33	97.1	:
10	60.5	66.83334	0	0.0	33	97.1	:
11	66.83334	73.16667	0	0.0	33	97.1	:
12	73.16667	79.5	1	2.9	34	100.0	:*

----------Descriptive Statistics----------

Detail Report

Variable: OCHRO-B1 Blood thiamine OCHRO method

Filter: SAMPLING = 4 Break: LVEL-SO4 = 2

Mean - Average	36.92667	No. observations	60
Lower 95% c.i.limit	33.98336	No. missing values	0
Upper 95% c.i.limit	39.86998	Sum of frequencies	60
Adj sum of squares	7659.297	Sum of observations	2215.6
Standard deviation	11.3938	Std.error of mean	1.470933
Variance	129.8186	T-value for mean=0	25.10425
Coef. of variation	.308552	T prob level	0.0000
Skewness	.2862208	Kurtosis	.1255734
Normality Test Value	1.021	Reject if > 1.080(10%)	1.124(5%)
100-%tile (Maximum)	66.9	90-%tile	51.55
75-%tile	45.25	10-%tile	22.9
50-%tile (Median)	35.65	Range	56.2
25-%tile	31.1	75th-25th %tile	14.15
0-%tile (Minimum)	10.7		

10.7----------Line Plot / Box Plot----------66.9
1 2 1 2 12 1 11 111263121223111 1 2 321112 1 1 1 11 1
1
----------[XXXXXXmaXXXXXXXXXXX]---------

Distribution & Histogram

Variable: OCHRO-B1 Filter: SAMPLING = 4
Break: LVEL-SO4 = 2

Bin	Lower	Upper	Count	Prcnt	Total	Prcnt	Histogram
1	10.7	14.71428	1	1.7	1	1.7	:*
2	14.71428	18.72857	3	5.0	4	6.7	:***
3	18.72857	22.74286	2	3.3	6	10.0	:**
4	22.74286	26.75714	4	6.7	10	16.7	:****
5	26.75714	30.77143	4	6.7	14	23.3	:****
6	30.77143	34.78571	15	25.0	29	48.3	:***************
7	34.78571	38.8	10	16.7	39	65.0	:**********
8	38.8	42.81429	2	3.3	41	68.3	:**
9	42.81429	46.82857	8	13.3	49	81.7	:********
10	46.82857	50.84286	5	8.3	54	90.0	:*****
11	50.84286	54.85714	1	1.7	55	91.7	:*
12	54.85714	58.87143	3	5.0	58	96.7	:***
13	58.87143	62.88571	1	1.7	59	98.3	:*
14	62.88571	66.89999	1	1.7	60	100.0	:*

----------Descriptive Statistics----------

Detail Report

Variable: LACTO-B1 Blood Thiamine LACTO method

Filter: SAMPLING = 1 Break: LVEL-SO4 = 1

Mean - Average	23.81212	No. observations	33
Lower 95% c.i.limit	20.1474	No. missing values	0
Upper 95% c.i.limit	27.47684	Sum of frequencies	33
Adj sum of squares	3418.215	Sum of observations	785.8
Standard deviation	10.33534	Std.error of mean	1.799152
Variance	106.8192	T-value for mean=0	13.2352
Coef. of variation	.4340369	T prob level	0.0000
Skewness	.3661054	Kurtosis	-.7499853
Normality Test Value	0.960	Reject if > 1.136(10%)	1.208(5%)
100-%tile (Maximum)	46	90-%tile	38.8
75-%tile	30.4	10-%tile	11.2
50-%tile (Median)	23.8	Range	38.6
25-%tile	15.8	75th-25th %tile	14.6
0-%tile (Minimum)	7.4		

7.4----------Line Plot / Box Plot----------46
1 11 1 1 1 112 1111 11 11 1 211 1 1 1 2 1 1 11
1
---------[XXXXXXXXXXXXXXXmXXXXXXXXXXXX]----------

Distribution & Histogram

Variable: LACTO-B1 Filter: SAMPLING = 1
Break: LVEL-SO4 = 1

Bin	Lower	Upper	Count	Prcnt	Total	Prcnt	Histogram
1	7.4	10.61667	3	9.1	3	9.1	:***
2	10.61667	13.83333	2	6.1	5	15.2	:**
3	13.83333	17.05	5	15.2	10	30.3	:*****
4	17.05	20.26667	4	12.1	14	42.4	:****
5	20.26667	23.48333	2	6.1	16	48.5	:**
6	23.48333	26.7	5	15.2	21	63.6	:*****
7	26.7	29.91666	3	9.1	24	72.7	:***
8	29.91666	33.13333	2	6.1	26	78.8	:**
9	33.13333	36.35	2	6.1	28	84.8	:**
10	36.35	39.56667	2	6.1	30	90.9	:**
11	39.56667	42.78333	2	6.1	32	97.0	:**
12	42.78333	46	1	3.0	33	100.0	:*

----------Descriptive Statistics----------

Detail Report

Variable: LACTO-B1 Blood Thiamine LACTO method

Filter: SAMPLING = 1 Break: LVEL-SO4 = 2

Mean - Average	24.69	No. observations	64
Lower 95% c.i.limit	22.42918	No. missing values	1
Upper 95% c.i.limit	26.95082	Sum of frequencies	63
Adj sum of squares	4996.365	Sum of observations	1555.47
Standard deviation	8.977	Std.error of mean	1.130996
Variance	80.58653	T-value for mean=0	21.83032
Coef. of variation	.3635885	T prob level	0.0000
Skewness	.1519355	Kurtosis	-.9081386
Normality Test Value	0.945	Reject if > 1.077(10%)	1.118(5%)
100-%tile (Maximum)	43.2	90-%tile	36.8
75-%tile	32.2	10-%tile	12.1
50-%tile (Median)	24.9	Range	32.2
25-%tile	17.1	75th-25th %tile	15.1
0-%tile (Minimum)	11		

11----------Line Plot / Box Plot----------43.2
222122 1 1 131 21 2 111 23 3 21 4 12 1 1112 14 22 1 11
1
----------[XXXXXXXXXXXXXXXXamXXXXXXXXXXXXXXX]----------

Distribution & Histogram

Variable: LACTO-B1 Filter: SAMPLING = 1
Break: LVEL-SO4 = 2

Bin	Lower	Upper	Count	Prcnt	Total	Prcnt	Histogram
1	11	13.3	11	17.5	11	17.5	:**********
2	13.3	15.6	2	3.2	13	20.6	:**
3	15.6	17.9	5	7.9	18	28.6	:*****
4	17.9	20.2	3	4.8	21	33.3	:***
5	20.2	22.5	4	6.3	25	39.7	:****
6	22.5	24.8	6	9.5	31	49.2	:******
7	24.8	27.1	6	9.5	37	58.7	:******
8	27.1	29.4	7	11.1	44	69.8	:*******
9	29.4	31.7	3	4.8	47	74.6	:***
10	31.7	34	3	4.8	50	79.4	:***
11	34	36.3	5	7.9	55	87.3	:*****
12	36.3	38.6	5	7.9	60	95.2	:*****
13	38.6	40.9	0	0.0	60	95.2	:
14	40.9	43.2	3	4.8	63	100.0	:***

----------Descriptive Statistics----------

Detail Report

Variable: LACTO-B1 Blood Thiamine LACTO method

Filter: SAMPLING = 2 Break: LVEL-SO4 = 1

Mean - Average	34.90909	No. observations	33
Lower 95% c.i.limit	31.39066	No. missing values	0
Upper 95% c.i.limit	38.42753	Sum of frequencies	33
Adj sum of squares	3150.767	Sum of observations	1152
Standard deviation	9.922775	Std.error of mean	1.727334
Variance	98.46148	T-value for mean=0	20.20981
Coef. of variation	.2842462	T prob level	0.0000
Skewness	3.735519E-02	Kurtosis	-.4129969
Normality Test Value	0.959	Reject if > 1.136(10%)	1.208(5%)
100-%tile (Maximum)	54.7	90-%tile	48.3
75-%tile	41.2	10-%tile	19.5
50-%tile (Median)	35	Range	38.3
25-%tile	30.6	75th-25th %tile	10.6
0-%tile (Minimum)	16.4		

16.4----------Line Plot / Box Plot----------54.7
1 1 2 1 1 11 211 2 11 111111 11 1 121 1 1 1
1
----------[XXXXXXXmXXXXXXXXXXX]----------

Distribution & Histogram

Variable: LACTO-B1 Filter: SAMPLING = 2
Break: LVEL-SO4 = 1

Bin	Lower	Upper	Count	Prcnt	Total	Prcnt	Histogram
1	16.4	19.59167	4	12.1	4	12.1	:****
2	19.59167	22.78333	1	3.0	5	15.2	:*
3	22.78333	25.975	1	3.0	6	18.2	:*
4	25.975	29.16667	2	6.1	8	24.2	:**
5	29.16667	32.35833	4	12.1	12	36.4	:****
6	32.35833	35.55	5	15.2	17	51.5	:*****
7	35.55	38.74167	6	18.2	23	69.7	:******
8	38.74167	41.93333	2	6.1	25	75.8	:**
9	41.93333	45.125	4	12.1	29	87.9	:****
10	45.125	48.31667	1	3.0	30	90.9	:*
11	48.31667	51.50833	1	3.0	31	93.9	:*
12	51.50833	54.70001	2	6.1	33	100.0	:**

----------Descriptive Statistics----------

Detail Report

Variable: LACTO-B1 Blood Thiamine LACTO method

Filter: SAMPLING = 2 Break: LVEL-SO4 = 2

Mean - Average	39.85625	No. observations	64
Lower 95% c.i.limit	36.38899	No. missing values	0
Upper 95% c.i.limit	43.32351	Sum of frequencies	64
Adj sum of squares	12138.32	Sum of observations	2550.8
Standard deviation	13.88062	Std.error of mean	1.735078
Variance	192.6717	T-value for mean=0	22.97087
Coef. of variation	.3482672	T prob level	0.0000
Skewness	1.452914	Kurtosis	3.466519
Normality Test Value	1.410	Reject if > 1.076(10%)	1.117(5%)
100-%tile (Maximum)	94.3	90-%tile	57.7
75-%tile	46.1	10-%tile	24.8
50-%tile (Median)	37.5	Range	77
25-%tile	30.05	75th-25th %tile	16.05
0-%tile (Minimum)	17.3		

17.3----------Line Plot / Box Plot----------94.3
1 1 13213212 21243343131 1 4 21 21 2 1 2 11 1
1
-----[XXXXXXmXXaXXXXX]----------

Distribution & Histogram

Variable: LACTO-B1 Filter: SAMPLING = 2
Break: LVEL-SO4 = 2

Bin	Lower	Upper	Count	Prcnt	Total	Prcnt	Histogram
1	17.3	22.8	2	3.1	2	3.1	:**
2	22.8	28.3	10	15.6	12	18.8	:**********
3	28.3	33.8	8	12.5	20	31.3	:********
4	33.8	39.3	19	29.7	39	60.9	:*******************
5	39.3	44.8	6	9.4	45	70.3	:******
6	44.8	50.3	7	10.9	52	81.3	:*******
7	50.3	55.8	3	4.7	55	85.9	:***
8	55.8	61.3	5	7.8	60	93.8	:*****
9	61.3	66.8	2	3.1	62	96.9	:**
10	66.8	72.3	0	0.0	62	96.9	:
11	72.3	77.8	0	0.0	62	96.9	:
12	77.8	83.3	1	1.6	63	98.4	:*
13	83.3	88.8	0	0.0	63	98.4	:
14	88.8	94.3	1	1.6	64	100.0	:*

----------Descriptive Statistics----------

Detail Report

Variable: LACTO-B1 Blood Thiamine LACTO method

Filter: SAMPLING = 3 Break: LVEL-SO4 = 1

Mean - Average	36.74	No. observations	30
Lower 95% c.i.limit	30.0039	No. missing values	0
Upper 95% c.i.limit	43.4761	Sum of frequencies	30
Adj sum of squares	9438.332	Sum of observations	1102.2
Standard deviation	18.0405	Std.error of mean	3.29373
Variance	325.4597	T-value for mean=0	11.15453
Coef. of variation	.4910317	T prob level	0.0000
Skewness	.4591782	Kurtosis	.2073001
Normality Test Value	1.017	Reject if > 1.149(10%)	1.228(5%)
100-%tile (Maximum)	83.7	90-%tile	59.25
75-%tile	46.6	10-%tile	13.05
50-%tile (Median)	37.05	Range	75.3
25-%tile	20	75th-25th %tile	26.6
0-%tile (Minimum)	8.4		

8.4----------Line Plot / Box Plot----------83.7
11 11 1 12 1 1 1 1 1 21 1112 1 1 1 2 1 1 1
1
-------[XXXXXXXXXXXXXXXamXXXXXXXXX]----------

Distribution & Histogram

Variable: LACTO-B1 Filter: SAMPLING = 3
Break: LVEL-SO4 = 1

Bin	Lower	Upper	Count	Prcnt	Total	Prcnt	Histogram
1	8.4	15.24545	4	13.3	4	13.3	:****
2	15.24545	22.09091	4	13.3	8	26.7	:****
3	22.09091	28.93636	2	6.7	10	33.3	:**
4	28.93636	35.78182	3	10.0	13	43.3	:***
5	35.78182	42.62727	6	20.0	19	63.3	:******
6	42.62727	49.47273	4	13.3	23	76.7	:****
7	49.47273	56.31818	4	13.3	27	90.0	:****
8	56.31818	63.16364	0	0.0	27	90.0	:
9	63.16364	70.00909	2	6.7	29	96.7	:**
10	70.00909	76.85455	0	0.0	29	96.7	:
11	76.85455	83.7	1	3.3	30	100.0	:*

----------Descriptive Statistics----------

Detail Report

Variable: LACTO-B1 Blood Thiamine LACTO method

Filter: SAMPLING = 3 Break: LVEL-SO4 = 2

Mean - Average	44.62581	No. observations	62
Lower 95% c.i.limit	40.96929	No. missing values	0
Upper 95% c.i.limit	48.28232	Sum of frequencies	62
Adj sum of squares	12646.32	Sum of observations	2766.8
Standard deviation	14.3985	Std.error of mean	1.828611
Variance	207.3167	T-value for mean=0	24.40421
Coef. of variation	.3226495	T prob level	0.0000
Skewness	.6050708	Kurtosis	6.038044E-02
Normality Test Value	1.032	Reject if > 1.078(10%)	1.120(5%)
100-%tile (Maximum)	84.8	90-%tile	63.4
75-%tile	53.4	10-%tile	27
50-%tile (Median)	42.1	Range	63.5
25-%tile	35.1	75th-25th %tile	18.3
0-%tile (Minimum)	21.3		

21.3----------Line Plot / Box Plot----------84.8
113 211 2 111312 261112 1311122 2 1 111 111111 1 11 1 1
1
----------[XXXXXXXXmXXaXXXXXXXXX]----------

Distribution & Histogram

Variable: LACTO-B1 Filter: SAMPLING = 3
Break: LVEL-SO4 = 2

Bin	Lower	Upper	Count	Prcnt	Total	Prcnt	Histogram
1	21.3	25.83571	5	8.1	5	8.1	:*****
2	25.83571	30.37143	4	6.5	9	14.5	:****
3	30.37143	34.90714	5	8.1	14	22.6	:*****
4	34.90714	39.44286	13	21.0	27	43.5	:**************
5	39.44286	43.97857	6	9.7	33	53.2	:******
6	43.97857	48.51429	9	14.5	42	67.7	:*********
7	48.51429	53.05	4	6.5	46	74.2	:****
8	53.05	57.58572	3	4.8	49	79.0	:***
9	57.58572	62.12143	4	6.5	53	85.5	:****
10	62.12143	66.65715	4	6.5	57	91.9	:****
11	66.65715	71.19286	2	3.2	59	95.2	:**
12	71.19286	75.72858	1	1.6	60	96.8	:*
13	75.72858	80.26429	1	1.6	61	98.4	:*
14	80.26429	84.8	1	1.6	62	100.0	:*

----------Descriptive Statistics----------

Detail Report

Variable: LACTO-B1 Blood Thiamine LACTO method

Filter: SAMPLING = 4 Break: LVEL-SO4 = 1

Mean - Average	40.36176	No. observations	34
Lower 95% c.i.limit	34.41026	No. missing values	0
Upper 95% c.i.limit	46.31327	Sum of frequencies	34
Adj sum of squares	9601.84	Sum of observations	1372.3
Standard deviation	17.05769	Std.error of mean	2.92537
Variance	290.9648	T-value for mean=0	13.79715
Coef. of variation	.4226201	T prob level	0.0000
Skewness	.2062468	Kurtosis	.2570171
Normality Test Value	1.039	Reject if > 1.133(10%)	1.202(5%)
100-%tile (Maximum)	82.1	90-%tile	63.2
75-%tile	51.7	10-%tile	21.2
50-%tile (Median)	37.75	Range	75.4
25-%tile	31.8	75th-25th %tile	19.9
0-%tile (Minimum)	6.7		

6.7----------Line Plot / Box Plot----------82.1
1 1 1 1 1 111 1 31113 21 2 2 2 1 2 1 1 1
1
----------[XXXXXmXXaXXXXXXXXXXX]----------

Distribution & Histogram

Variable: LACTO-B1 Filter: SAMPLING = 4
Break: LVEL-SO4 = 1

Bin	Lower	Upper	Count	Prcnt	Total	Prcnt	Histogram
1	6.7	12.98333	3	8.8	3	8.8	:***
2	12.98333	19.26667	0	0.0	3	8.8	:
3	19.26667	25.55	2	5.9	5	14.7	:**
4	25.55	31.83333	4	11.8	9	26.5	:****
5	31.83333	38.11667	9	26.5	18	52.9	:*********
6	38.11667	44.4	3	8.8	21	61.8	:***
7	44.4	50.68333	4	11.8	25	73.5	:****
8	50.68333	56.96667	5	14.7	30	88.2	:*****
9	56.96667	63.25	1	2.9	31	91.2	:*
10	63.25	69.53333	1	2.9	32	94.1	:*
11	69.53333	75.81667	1	2.9	33	97.1	:*
12	75.81667	82.1	1	2.9	34	100.0	:*

----------Descriptive Statistics----------

Detail Report

Variable: LACTO-B1 Blood Thiamine LACTO method

Filter: SAMPLING = 4 Break: LVEL-SO4 = 2

Mean - Average	46.28833	No. observations	60
Lower 95% c.i.limit	42.9988	No. missing values	0
Upper 95% c.i.limit	49.57787	Sum of frequencies	60
Adj sum of squares	9567.202	Sum of observations	2777.3
Standard deviation	12.73405	Std.error of mean	1.643958
Variance	162.156	T-value for mean=0	28.15663
Coef. of variation	.2751027	T prob level	0.0000
Skewness	.1493133	Kurtosis	-.4696963
Normality Test Value	0.971	Reject if > 1.080(10%)	1.124(5%)
100-%tile (Maximum)	75.1	90-%tile	62.6
75-%tile	55.95	10-%tile	30.8
50-%tile (Median)	44.25	Range	55.7
25-%tile	37.3	75th-25th %tile	18.65
0-%tile (Minimum)	19.4		

19.4----------Line Plot / Box Plot----------75.1
1 1 1 1 11 112 212 11122 511311 13 1 112112 11212 1 2 1 1
1
---------[XXXXXXXXXmXXaXXXXXXXXXXX]---------

Distribution & Histogram

Variable: LACTO-B1 Filter: SAMPLING = 4
Break: LVEL-SO4 = 2

Bin	Lower	Upper	Count	Prcnt	Total	Prcnt	Histogram
1	19.4	23.37857	2	3.3	2	3.3	:**
2	23.37857	27.35714	2	3.3	4	6.7	:**
3	27.35714	31.33571	2	3.3	6	10.0	:**
4	31.33571	35.31429	6	10.0	12	20.0	:******
5	35.31429	39.29285	5	8.3	17	28.3	:*****
6	39.29285	43.27143	10	16.7	27	45.0	:**********
7	43.27143	47.25	7	11.7	34	56.7	:*******
8	47.25	51.22857	4	6.7	38	63.3	:****
9	51.22857	55.20714	6	10.0	44	73.3	:******
10	55.20714	59.18572	5	8.3	49	81.7	:*****
11	59.18572	63.16428	5	8.3	54	90.0	:*****
12	63.16428	67.14285	3	5.0	57	95.0	:***
13	67.14285	71.12142	1	1.7	58	96.7	:*
14	71.12142	75.1	2	3.3	60	100.0	:**